Harbor District Land & Water Use Plan

Interim Report #2

Market Analysis

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Table of Contents

Introduction

The Harbor District is the historic and economic heart of Milwaukee, located along Lake Michigan just south of the central business district, between the city's Third Ward, Walker's Point, and Bay View neighborhoods. In 2015, a nonprofit organization called Harbor District, Inc. (HDI) was formed to guide the planning and redevelopment process of this area. The City of Milwaukee contracted with AECOM to complete a Water and Land Use Plan (WaLUP) to guide long-range redevelopment efforts in the district.

The WaLUP study area is bounded to the north by the Milwaukee River and Pittsburgh Avenue, to the west by S. 2nd Street , Interstate 43 and the Kinnickinnic River, to the south by Chase Avenue, Ward, Bay, Conway and Russell Streets; and to the east by Lake Michigan. The district includes the entirety of the Port of Milwaukee.

The market analysis supports Harbor District planning by:

1. Establishing a snapshot of economic activity in the District
2. Summarizing neighborhood workforce characteristics
3. Identifying trends in Great Lakes port activities and competitive advantages for the Port of Milwaukee
4. Summarizing the outlook for industrial activity in the Milwaukee region and Harbor District
5. Reporting on the redevelopment experiences of working waterfront districts in other cities
6. Evaluating the potential relative value of land use changes in the District in terms of creating tax base and providing the potential for employment

The report uses data from a variety of sources, including key informant interviews, US census and business census, City of Milwaukee property records, Bureau of Transportation statistics and proprietary data. This report documents findings and assumptions used in developing the analysis. These data sources, of course, have inherent limitations and the results of their evaluation should be understood in the context of those limitations.

The findings from this market analysis will be used in conjunction with other analyses and the products of the WaLUP stakeholder involvement process to determine preferred future land uses and their locations in the Harbor District.

Key findings and their implications for planning are summarized beginning on page 51.

Planning Context

The Harbor District is the historic and economic heart of the Milwaukee, located along Lake Michigan just south of downtown Milwaukee, between the city's Third Ward, Walker's Point, and Bay View neighborhoods. In 2015, a nonprofit organization called Harbor District, Inc. (HDI) was formed to guide the planning and redevelopment process of this area. The City of Milwaukee contracted with AECOM and its partners Matt Schumwinger, Gensler and P3 Development Group to complete a Water and Land Use Plan (WaLUP) to guide long-range redevelopment efforts in the district.

The WaLUP study area is bounded to the north by the Milwaukee River and Pittsburgh Avenue, to the west by S. 2nd Street , Interstate 43 and the Kinnickinnic River, to the south by Chase Avenue, Ward, Bay, Conway and Russell Streets; and to the east by Lake Michigan. The district includes the entirety of the Port of Milwaukee.

City of Milwaukee Area Planning Structure

The City of Milwaukee completes long-range comprehensive planning through the creation of separate "area" plans covering the entire city. These plans help guide future neighborhood development with land use, design, and catalytic project recommendations. Final recommendations for the Harbor District are intended to be consistent with and guided by the area plans adopted for the district. Additional city-wide policy, environmental and economic development plans are included in the city's comprehensive plan structure.

The boundaries of the Harbor District fall within two area plans: the Near South Side plan, which includes most of the district west of the river and north of approximately Mitchell Street, and the Southeast Side Plan, which includes the Port of Milwaukee, major harborside redevelopment sites, and everything south of approximately Mitchell Street.

Within the Near South Side Plan, the City has also adopted the Walker's Point Strategic Action Plan, which provides more detailed guidance for the area of the district north of Mitchell Street.

Within the Southeast Side Plan, the City has adopted the Bay View Wetland master plan, which provides a sustainable development concept for former Grand Trunk Railroad site on Marina Dr. north of Bay St.

In addition, the City has completed a Redevelopment Plan for the Port of Milwaukee. The study area of this plan covers much of the district, and the plan seeks to provide guidance on supporting the Port into the future, redeveloping brownfields, enhancing environmental restoration and assisting the area's water-reliant industries.

The Harbor District planning area is shown in figure 1.

Figure 1: Milwaukee's Harbor District

Planning Process and Outcomes

The Harbor District Water and Land Use Plan was completed using a detailed planning process developed to provide a balance of economic analysis, urban design, and infrastructure development, all guided by a significant stakeholder and public involvement effort. Ultimately, the WaLUP planning process was designed to develop a preferred future land use mix for the District that responds to both the realities of Milwaukee's slow economic growth and the desires of stakeholders and Harbor District neighbors. The plan recommends catalytic investments, policies and initiatives and an implementation strategy to bring that desired future condition to reality.

The Harbor District

The Harbor District is located in the historic center of the Milwaukee region, at the confluence of the Milwaukee and Kinnickinnic Rivers. The district is home to Jones Island, a peninsula separating the lake from the river estuary, which houses the Port of Milwaukee and other civic infrastructure. The District is the geographic link between the city's central business district and dense urban neighborhoods to the south and southwest.

Historic Uses and Activity

Jones Island, which today is a peninsula and home to the Port of Milwaukee, was once a marshy barrier island between the Milwaukee and Kinnickinnic Rivers and Lake Michigan. Centuries of fill and dredging have shaped the island into its present form, and moved the outlet of the river from the south end of the island to its present location at the northern tip.

The outer harbor area was originally home to German and Polish immigrants who made their living as fishermen, while the inner harbor developed with industrial uses. The construction of major railroad lines through the area cemented the district as one of the city's major industrial districts, with access both to water and rail shipping, and warehousing, manufacturing uses flourished along the inner harbor throughout the 19th and 20th centuries. The residences were removed from Jones Island in the 1920s, and a wastewater treatment plant was constructed, still in use today. As water transport became relatively less critical to the region's economy during the course of the 20th century, port and transportation uses were consolidated onto Jones Island, while the area on the west side of the estuary remains in primarily industrial use, with several large vacant or underutilized parcels on the water's edge.

The Harbor District Today

Neighborhood Context

The Harbor District planning area is bordered by neighborhoods with distinctive characters that contribute strongly to the city's economic and cultural wealth. The key adjacent areas include:

- The Historic Third Ward. Located across the Milwaukee River to the north, the Third Ward is a densely redeveloped warehouse district, featuring a mix of multi-family housing, retail and

office uses. The area includes the Meier Festival Grounds – home of Summerfest – on the shore of Lake Michigan.

- Walker's Point. West of the Harbor District, the Walker's Point neighborhood is among the oldest in the city. It is characterized by small scale mixed uses – single-family residences, duplexes, commercial and institutional uses along with small scale industrial operations – and one of the largest foreign-born populations in Milwaukee.
- Bayview. Located to the south of the Harbor District, Bayview is a slowly gentrifying neighborhood built out at a fine scale, with single- and two-family housing, some multifamily housing, commercial and industrial uses organized along the spine of Kinnickinnic Avenue. Bayview features shoreline parks and a concentration of transportation and manufacturing uses in its northern end, the area included in the Harbor District planning area.

Economic Context

The Harbor District is home to thousands of employees in businesses across a broad range of sectors, but focused on manufacturing, transportation, retail, wholesale trade, health care and social assistance. Nearly half of the district's land area is dedicated to manufacturing. It is the point of entry and exit for materials shipped by water – including grain, road salt, steel, chemicals and fabricated goods – through the Port of Milwaukee. Many of these items are stored in the Harbor District prior to distribution. Marine service industries are located upstream of the estuary on the Kinnickinnic River.

Key land uses, Institutions, Businesses

The Harbor District has been at the center of Milwaukee's economy for more than 150 years. Although civic institutions are located elsewhere in the city, the District includes several important establishments, businesses and land uses and facilities with regional impact.

- Port of Milwaukee
- Rockwell Automation World Headquarters
- University of Wisconsin-Milwaukee School of Freshwater Sciences
- Jones Island Wastewater Treatment Plant
- Milwaukee County Transit System Kinnickinnic Avenue Operating Station
- Lake Express Ferry Terminal (Milwaukee to Muskego, MI)
- US Coast Guard Milwaukee Station
- Rail Viaduct (Amtrak and freight services)
- Milwaukee County Boat Launch
- Interstate Highway 794 and Daniel Hoan Bridge

General Economic Conditions in the Harbor District

The Harbor District is an historic hub of economic activity in the Milwaukee region. The planning area includes 485 parcels comprising approximately 865 acres (excluding rights of way). Half of that area is in public ownership. Nearly 30% of the land is used for warehousing, with another 10% dedicated to other industrial uses. In addition, another 30% is used for transportation activities. Currently, approximately 8,000 people are employed in the district, with nearly half of those jobs in industrial sectors, and an additional 7% in transportation and warehousing. Nineteen percent of the District's jobs are in Healthcare and Social Assistance. Overall job density in the Harbor District is nine jobs per acre. Less than 11% of the workers in the District live in adjacent neighborhoods.

The taxable value of land and improvements of all properties in the Harbor District averages $6.11 per square foot. The figure for the City of Milwaukee as a whole is $4.44 per square foot. The value of the district's non-tax exempt property averages $9.16 per square, compared to $5.14 for the City of Milwaukee as a whole.

Key economic activity and employment generators in the Harbor District include:

- The Port of Milwaukee
- The University of Wisconsin School of Freshwater Sciences
- The Jones Island Wastewater Treatment Plant
- Rockwell Automation World Headquarters
- Retail district along S. 1st Street
- Independence First headquarters
- Marine service businesses along the Kinnickinnic River

Workforce Characteristics

Workforce characteristics in the three zip codes directly surrounding the Harbor District (53202, 53204 and 53207) were analyzed to compare to the metropolitan area. Figure 2 shows the geographies. Each of these three zip codes represents unique neighborhoods within the city, and as such aggregating them together presents challenges. This area includes the Third Ward (53202), a largely white and wealthy area; Bay View and the south side (53207), which is slightly less affluent; and Walker's Point (53204), which is very diverse. However, by combining the data, a picture emerges of the overall demographics of the workforce directly available to businesses in the district.

Figure 2: Workforce analysis geography

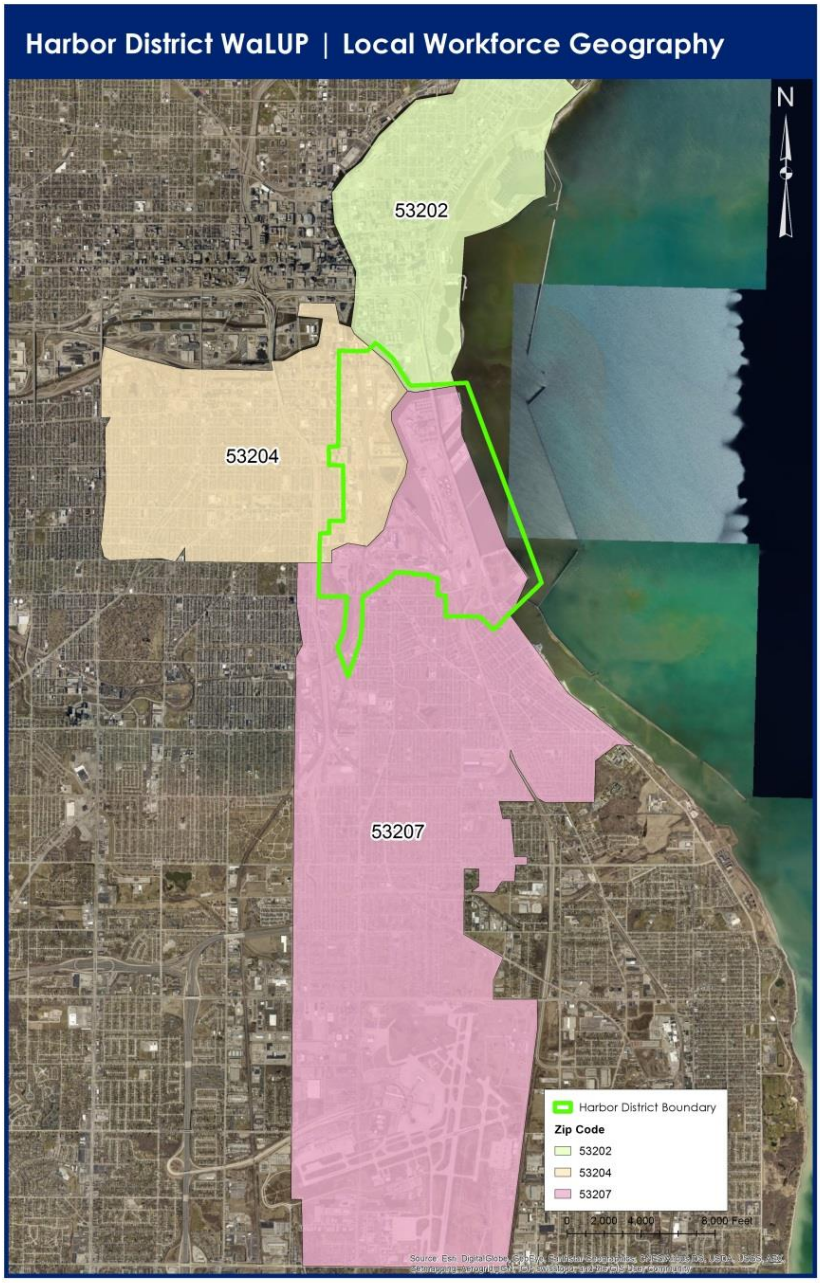


Figure 3 on the following pages highlights key characteristics of the adjacent labor force. Neighborhood characteristics with 4% or greater differences compared to the metropolitan area are highlighted in red. Where available, certain values were compared to 2000 data to analyze trends in local labor force demographics. For these values, the change in value between 2000 and 2014 is noted in parentheses following the 2014 value.

Figure 3: Workforce Characteristics

	Neighborhood			City of Milwaukee	MSA
	53202	**53204**	**53207**		
Labor force	18094	17575	22701	296,578	831,557
Unemployed	5% (0%)	16% (+3%)	7% (+2%)	8.5%	5%
Occupation	**53202**	**53204**	**53207**	**City**	**MSA**
Management, business, science, arts	60% (+8%)	14% (+4%)	41% (-12%)	30%	38%
Service	19% (+6)	32% (+7%)	18% (+3%)	24%	17%
Sales & Office	19% (-6%)	14% (-2%)	23% (-5%)	23%	25%
Natural resources, construction, maintenance	2% (-1%)	11% (+3%)	6% (-2%)	6%	6%
Production, transportation, material moving	5% (-1%)	30% (-11%)	12% (-7%)	17%	14%
Education (age 25 and over)	**53202**	**53204**	**53207**	**City**	**MSA**
Less than high school	5%	42%	9%	18%	10%
High school graduate	9%	30%	27%	30%	27%
Some college or associate's degree	20%	19%	29%	29%	30%
Bachelor's degree or higher	66%	9%	36%	29%	33%
Earnings in past 12 months (full-time workers)	**53202**	**53204**	**53207**	**City**	**MSA**
Under $15,000	5%	18%	5%	7%	4%
$15,000 to $24,999	7%	33%	11%	18%	12%
$25,000 to $34,999	13%	22%	17%	21%	16%
$35,000 to $49,999	24%	14%	26%	23%	22%
$50,000 to $74,999	27%	10%	28%	21%	25%
$75,000 or more	23%	4%	12%	10%	22%

NB: differences of more than 4% are highlighted in red; changes in value from 2000 to 2014 are noted in parentheses.

	Neighborhood			City of Milwaukee	MSA
	53202	**53204**	**53207**		
Median earnings (2014 dollars)	$39,772 (+$5,428)	$19,507 (-$1,702)	$36,936 (+$425)	$24,204	$32,310
Median Age	30.4 (-2.7)	27.6 (+2.4)	36.1 (-1)	30.8	37.2
Commute to work	**53202**	**53204**	**53207**	**City**	**MSA**
Car (alone or with others)	71%	81%	88%	82%	89%
Public transit, walked, biked, or work from home	28%	17%	11%	17%	11%
Households paying more than 30% of income in housing costs	**53202**	**53204**	**53207**	**City**	**MSA**
Those making under $20,000	88%	93%	92%	92%	91%
Those making $20,000 to $49,999	47%	51%	52%	53%	53%
Those making $50,000 to $74,999	23%	10%	20%	18%	23%
Those making $75,000 or more	7%	5%	2%	4%	6%

NB: differences of more than 4% are highlighted in red; changes in value from 2000 to 2014 are noted in parentheses.

Labor Force Data Analysis

Compared to that of the four-county Milwaukee metropolitan statistical area, the workforce in the neighborhoods adjacent to the Harbor District is relatively younger, more likely to be unemployed, slightly lower earning, , and with a higher proportion of workers lacking a high school diploma.

Some workers in the neighborhoods around the District are more likely to be employed in manufacturing or service jobs than are their peers across the region, but the local workforce's reliance on manufacturing jobs has decreased markedly since 2000. The lowest-earning segment of the workforce in the Harbor District is highly likely to spend more than 30% of its earnings on housing, similarly to the comparable class of workers region-wide. This is a key measure of economic stress. Neighborhood workers commute to work by private vehicle at similar rates to workers throughout the region.

Over time, workforce characteristics in the adjacent zip codes have evolved. Salient changes include:

- Unemployment has risen in Walker's Point (54204) and Bay View (53207). Unemployment in Walker's Point remains considerably higher than in the city as a whole or in the other areas adjoining the Harbor District.
- The proportion of residents engaged in manufacturing work has dropped in all three zip codes. Walker's Point workers have seen the largest reduction, and the greatest increase in the proportion of resident workers in the service industries.
- Workers in Walker's Point have seen a reduction in inflation-adjusted earnings between 2000 and 2014. Workers in the other zip codes held level or increased. This reduction in earnings could be related to the shift from manufacturing to service work. Walker's Point workers earn substantially less than their peers in the city as a whole.
- The Third Ward and Bay View have become younger over the last 15 years, reflecting the relative attractiveness of those neighborhoods to the "millennial" generation. Walker's Point has aged somewhat in that period, but still remains the youngest zip code of the three, with a median age well below the city and regional medians.

Generally speaking, the workers in the Walker's Point neighborhood have lost economic ground over since the 2000 census. High unemployment rates, low educational attainment and a shift to service employment from relatively higher paying manufacturing work have combined to drive earnings down in real dollars. The Harbor District has the potential to support industrial employment in both emerging and mature industries, offering employment possibilities that may be attainable by some of these workers. Increasing the amount of retail and office development in the district is likely to improve short term employment prospects (through the addition of construction jobs), but professional jobs may not be accessible to workers without college degrees, and retail and service jobs tend to be lower paying than industrial employment.

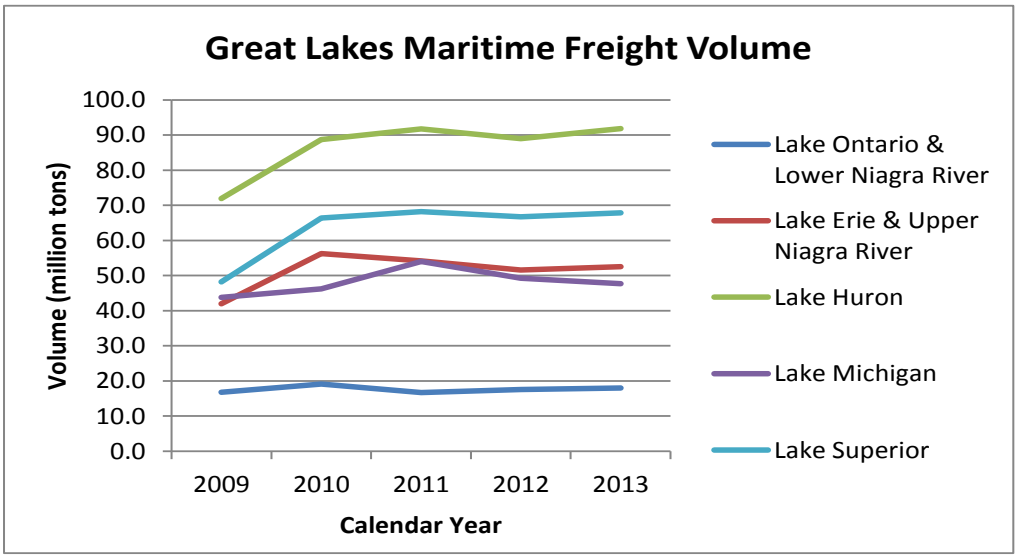
Port Operations Evaluation

The Port of Milwaukee is a key hub supporting Milwaukee's industrial economy, linking maritime, highway and rail transportation. Port operations are set in a complex and interlocking context of regional industrial demand and outputs, shipping trends across the Great Lakes, commodity and fuel prices, national and international general economic conditions.

Great Lakes Freight Context

Generally speaking, Great Lakes shipping is focused on bulk materials such as minerals, grain, and iron ore; these commodities are responsive to the economies of scale proffered by maritime shipment. The overall context for Great Lake shipping activity in which the Port of Milwaukee operates is shown in figure 4 for the most recent available five year period. In the post-recession period, freight movement on the Great Lakes improved until 2010, and since then has remained flat, in part reflecting overall trade and a sluggish economy. Overall volumes on Lake Michigan have grown only slightly in that period, lagging somewhat compared to other lakes, due to the specific cargoes and demands of regional economies: changes in coal usage for power generation affected freight volumes on the lakes during this period, for example. Similarly, the 2013 lakewise shipments of iron ore came to approximately 37 million tons, a freight movement particularly well suited to the Great Lakes maritime transportation system, but which largely bypasses Lake Michigan. Finally, the reliability of the transportation infrastructure on the lakes can have affects across the Great Lakes freight system. For example, the Poe Lock in Sault St. Marie is in need of major rehabilitation. If the lock – through which most of that iron ore passes -- were to be compromised, fifteen Great Lakes ports would begin a search for new cargoes, dramatically affecting competitiveness for ports like Milwaukee. Though data weren't available when this analysis was conducted, it should be noted that 2014 lakewise shipments seemed to be showing increased volumes generally.

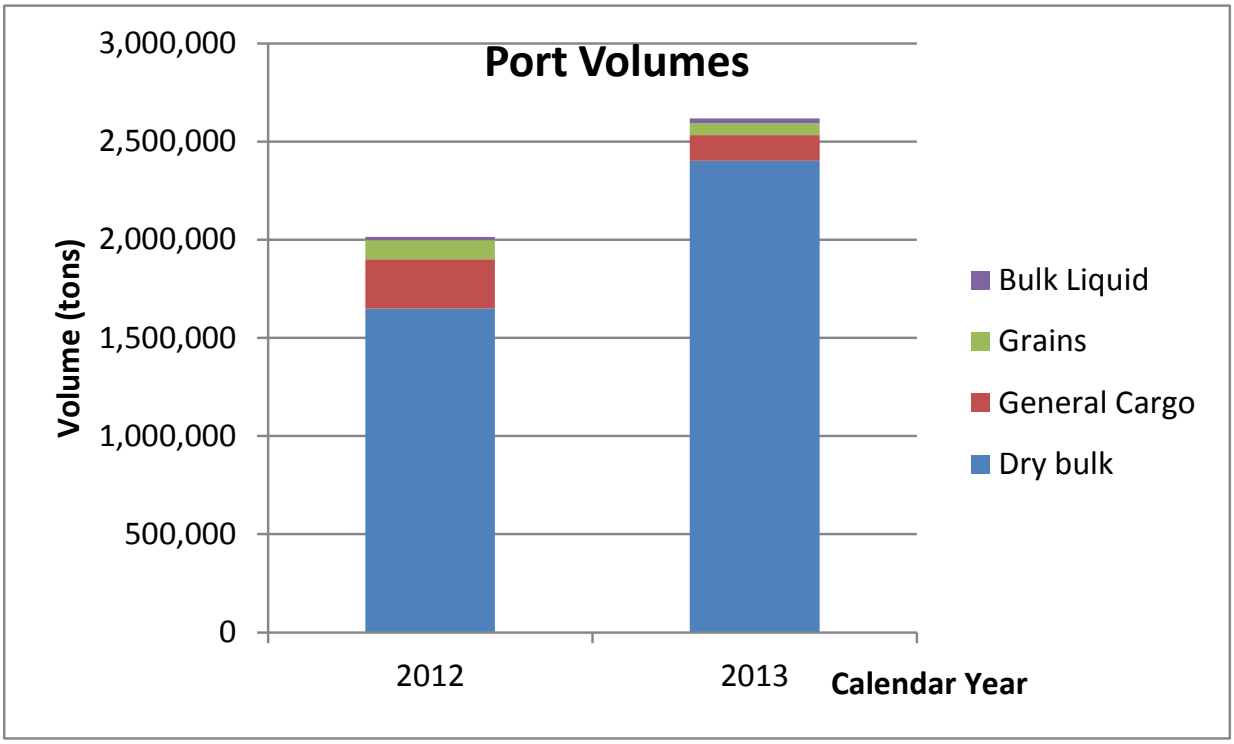
Figure 4: Great Lakes Maritime Freight Trends



Port of Milwaukee

In 2013, the Port of Milwaukee handled about 5%-6% of Lake Michigan's freight by tonnage. It can be misleading to compare ports on volumes – for example, a port that handles primarily iron ore will show much higher tonnages than one that doesn't – but the number provides a snapshot of the level of activity at the port. The mix of products from year to year is extremely dynamic. The Port of Milwaukee's business model focuses on staging inventory for local use. That is, bulk materials are shipped to and from the port and in many cases stored on site until they are needed in the local supply chain. The Port of Milwaukee ships grain and receives coal, salt, cement and bulk liquids, as well as ships and receives general and project cargoes. Dry bulk materials make up the vast majority of the volumes of goods moving through the port. Figure 5 shows the total volumes for 2012 and 2013. Relative volumes can shift from year to year due to fluctuations in transportation costs and product movement to national and global markets, based on the port's relationship to the larger economic and shipping dynamic described in the previous section.

Figure 5: Port of Milwaukee Volumes



Of the 109 actively used acres controlled by the Port of Milwaukee on Jones Island, one-third is used for dry bulk storage and an equal area for active loading and unloading. Fourteen acres – about 13% -- is used for liquid bulk material storage and an additional 22% of the land area is vacant, representing 24 acres. The port controls the Grand Trunk site on the east side of the Kinnickinnic River mouth; this site features shallow draft access suitable for river barge traffic and is the locale of a planned wetland

restoration. An additional 13 acres are controlled by the Port on the west side of the turning basin at the Wagon Works site. The Wagon Works site is leased to Kinder Morgan and was used to store coal for the Valley Power Plant. That facility has converted to natural gas, and coal storage is currently being phased out of the parcel as the Port and Kinder Morgan evaluate options for the site.

Freight movement in the Port of Milwaukee is likely to continue to be dynamic. The Port of Milwaukee is a landlord port, and is viewed favorably in the industry for its service and responsiveness to tenants. As a landlord port, the Port of Milwaukee relies on its tenants – Kinder Morgan and others – to determine the best use of its land and to respond to shifting needs for moving project cargoes on and off the water. Freight movement requires continuous adaptation to changing economic exigencies, and substantial shifts in freight movement can take place relatively quickly. For example, crude oil and crude iron ore (taconite) shipments have seen dramatic swings in volumes in recent years. As a landlord port, Milwaukee cedes some decision-making authority to its tenants to respond to this constantly evolving landscape. The port's tenants have deep understanding of the dynamics of Great Lakes shipping – and are of course driven by maximizing profitability in the marketplace -- but they cannot be expected to be equally attuned to Milwaukee's development needs. The Port of Milwaukee offers very long leases to its tenants, up to 100 years, which may prove to be a disincentive to timely, active adaptation to changing markets.

The Port of Milwaukee offers several distinct competitive advantages and opportunities for the movement of freight:

1. A key advantage for shipping through Milwaukee is the ability to avoid congestion across all modes in the Chicago region. Three of the country's top 25 congested freeway interchanges are located in Chicago; none is located in Milwaukee. The presence of a dense highway network and freight rail corridors, combined with an ability to leverage improvements to the Marquette Interchange, Hoan Bridge and I-41/43/94 corridors represents a significant asset for the Port.
2. The Port is well situated to capitalize on existing multimodal freight corridors, such as those connecting Madison, Janesville, Beloit and Rockford through the Port of Milwaukee. For example, in the past, stainless steel coils bound for industries in Rockford have moved through the Port. It may be possible to build on these connections to identify similar project cargoes. The Port also functions as an inland river port offering direct barge shipment to and from the Gulf of Mexico, potentially extending its regional reach into Iowa, Illinois and Minnesota.
3. With foresight and effort, there is the potential to separate corridors and land uses to the north of the Port, while better linking the Port to industrial areas to the south where access and connections are already strong. This would allow the Port to focus its development efforts on Jones Island and points south, while taking advantage of the natural separation from land uses to the north and west of the Kinnickinnic River. Efforts like these could have considerable benefits for freight movement throughout the region; acting on this opportunity would require coordination around freight movement across all modes throughout the city.
4. The Port is served by two Class 1 railroads, Reasonable railroad network upgrade configurations are possible; this will require examining Milwaukee's yards and terminals for access to industrial sites –

including gaining the perspective from industry. This may involve evaluation of the cost effectiveness of maintaining or upgrading service to the Solvay Coke and Wagon Works sites which are currently accessible by rail but offer limited truck access due to low railroad bridge clearances on adjacent roadways. More reliable rail access could potentially somewhat offset the restrictions on truck access for some industrial users.

5. The Port has an ability to identify and mobilize around transformative sites. The Port currently is in control of underutilized land on Jones Island that offers opportunity for adaptation to evolving markets. These sites offer good access to points south.
6. The Port offers well-established shipper outreach efforts. As noted above, port tenants in interviews praised the Port of Milwaukee for its responsiveness to their needs.
7. The Port offers continued CDF stewardship, with the potential to restore public use as practicable in the future. In peer communities such as Port of Cleveland, restoration of the CDF as a natural area offered greening of the waterfront and attracted visitors to an area in close proximity to the working port, increasing awareness and appreciation for the contributions of a working waterfront to the city.

Port Operations Case Studies

If the Port of Milwaukee can be characterized as providing materials staging for the local use, other ports have been able to design and promote substantially different experiences, in some cases engaging in long-running intentional repurposing of their port lands. Peer ports were identified based on their cargoes, configurations, intermodal transfer capabilities and their experiences in identifying emerging markets. While they may not look like the Port of Milwaukee – not all are located in large metropolitan areas or even on the Great Lakes – they are substantially similar in the ways they operate and, more importantly, provide information on effective means to respond to market challenges.

Interviews were conducted with port directors and, additionally, international shipping firms with interests in Great Lakes ports. With freight shipments across the Great Lakes generally flat, most regional ports are experiencing conditions similar to Milwaukee: stability. The case studies show that ports that are successful in developing new markets or more actively managing both land use and development do so with long term involvement from their port authorities in the industrial development aspects of freight movement. That is, the authorities work closely with regional industries and commodities shippers to identify needs. Findings from these interviews are summarized here, focusing the strategies used by these port operators to adapt their business models to evolving market conditions.

Port of Algoma: Active Collaboration to Prioritize Freight Velocity

Located on the Lake Superior side of the Sault Ste. Marie “Soo” Locks, the Port of Algoma is a former steel mill terminal area with marine facilities and infrastructure. The Port is designed to accommodate inbound raw materials and outbound shipping of finished goods. Algoma offers an example of port

management actively working with specific industry sectors to provide support, add value to regional economic development initiatives and to focus on regional job creation.

The Port of Algoma serves the steel production industry in Ontario. In identifying assets, the port noted that it is situated at the pivot point between three of the Great Lakes, and had available area for its core utility, industrial sites and port infrastructure. Following a re-alignment of area steel productions facilities in response to changing market conditions, the port administration worked closely with regional businesses in a long-term effort to repurpose and rationalize the existing industrial footprint in the port area. The strategy called for reducing on site inventory storage and greatly increasing freight velocity across each commodity and product type. Excess lands and facilities were repurposed to meet the industry's near-term production volumes by tightening regional supply chains and ensuring faster throughput of materials at the port. The plan anticipates filling an extensively deteriorated 1,700 ft. x 300 ft. slip with little remaining freight purpose in order to extend a bulk liquid storage area. Further, a 1,400 ft. waterfront quay will be constructed, including select harbor and river dredging, to accommodate new product storage such as wood chips. These projects are forecast to create 1,300 construction jobs, with eventual direct port employment of about 250 people and more than 1,200 related jobs in logistics and landside transportation.

Additionally, the Port of Algoma repositioned the port's existing proprietary facility to accommodate third party lessors and goods movement as the port works continuously to identify a diversified port capacity for cargoes moving along the Great lakes and through the region. Much of the new materials moving through the port are expected to be fiber, forest and energy products, particularly as 440 acres of industrial land are made available behind the existing and planned maritime infrastructure.

Port of Cleveland: Alignment with Community Development Goals

As a metropolitan area, Cleveland bears a strong resemblance to Milwaukee, with a related industrial and waterborne transportation history, as well as similar demographic and workforce characteristics. The Port of Cleveland's role in redeveloping the city's waterfront is documented in detail in a later section of this report, but efforts specific to port operations are summarized here.

The Port of Cleveland services waterborne commerce near the industrial core of the Midwest. The Port sees limited Great Lakes traffic but serves extensive industrial sites accessible along six miles of Cuyahoga River waterfront. Like many port cities, Cleveland is actively reducing the industrial footprint along its lakefront in order to enable redevelopment with other uses. The port's involvement in this effort provides examples of creative thinking that may be applicable to Milwaukee. The port's 2011 strategic plan is explicitly aligned with regional community development goals, focusing on job growth and business expansion, the development of civic assets, and maximizing economic, environmental and community benefits through its operations. This has led the port to actively manage natural areas for public use, lead renewal efforts for public infrastructure, to incorporate sustainable design and management efforts into its ongoing program, and to undertake an asset management approach to its facilities. The port has consolidated operations and redeveloped industrial waterfront land with mixed uses.

The Port of Cleveland provides redevelopment and financing services, including customized financing for development of facilities on port controlled lands. For example, the port has financed the development of a commercial vehicle maintenance center with the Ohio Department of Transportation as the long-term tenant using an innovative design-build leaseback model. The port is able to make use of its bonding capacity to provide project financing.

The Port of Cleveland actively works to align regional freight movements across all modes. In a further example of creative strategic initiatives, the port's Cross Lake Ferry received considerable attention between 2009 and 2012, as Lake Erie industries were revisiting supply chains and congestion began to return to the roadway corridors with the economic recovery. Discussions between Cleveland, and Central Elgin, Ontario, representing Port Stanley, took place as well as between other port and city pairs. Currently, the innovative concept is struggling to align to changing market conditions for the industries most poised to benefit from such a service.

Port of Toledo: Terminal Operator as Strategic Catalyst

Another metropolitan port, Toledo is similar in operations and assets to the Port of Milwaukee. Toledo handles primarily bulk materials, as does Milwaukee, and is in control of extensive industrial areas with good highway access. The port owns warehouses which are leased to a port operator, and the port invests in fixed and mobile infrastructure assets, such as cranes. Rail connections into the port are somewhat constrained.

The Port of Toledo operates as an economic development agency, and a developer of industrial sites. Under its brownfield redevelopment program, the Port Authority acquired a former petroleum operation with more than 180 waterfront acres. Working with a terminal operator, the port has developed the site for industrial and shipping uses. The improvements include a rail loop, dock upgrades, laydown space, dry bulk conveyance facilities and intermodal transfer facilities and warehouse space. The site is development ready, and provides access to all utilities including fiber optic. The redevelopment was speculative, and the authority is currently seeking tenants. The port actively leveraged interest and funding from numerous agencies to complete the site redevelopment.

The Port of Toledo, like the Port of Cleveland, offers numerous innovative financing options for economic development. These include fixed interest revenue bonds, infrastructure financing through tax incremental financing and special-assessment backed bonds with tax exemptions.

The port focuses its marketing and research efforts on freight movement and identifying potential cargo types in concert with local industry. The market role for heavy lift cargoes provided the project support for a recent investment in quayside cranes.

Port of Dubuque: Rethinking Lease Models

The Port of Dubuque is located on the Mississippi River, in a metro area of nearly 400,000 people between the major population centers of Minneapolis-St. Paul and St. Louis. Like the Port of Milwaukee, operations in Dubuque focus on moving bulk materials on and off the water for use in local markets.

The Port of Dubuque has undertaken an initiative to restructure its lease terms in order to create a more dynamic port that is able to respond more quickly to fluid market conditions. The new lease model is

designed to promote availability of industrial waterfront land and to accommodate emerging industries and industries with differing site use requirements.

Rather than the extremely long term leases of the past, the Port of Dubuque now offers lease terms with a maximum of 20 to 25 years for waterfront parcels. These terms allow stability and predictability of costs to businesses and also create incentives for industries to maximize their return on port investments. Over the life of the lease, the port sustains existing infrastructure and depth of water and allows the tenant to invest in the infrastructure particular to its business needs. At the end of the lease term, trade fixtures – for example bulk handling and loading equipment – remains with the tenant, which has the option to remove it at that time. Lease rates are negotiated with tenant in a manner that takes into account the complex economics of bulk material handling and transportation, including making use of an inflation adjustment considering the Consumer Price Index, Producer Price Index and trends in commodity prices.

Several leases at the Port of Dubuque have been renegotiated. Given the opportunity to renew a lease under the new terms, one legacy tenant left for a different site nearby. The new lease terms allow the Port of Dubuque to balance the value of water access in its fee structure – the unique attribute of a port – and place less reliance on historic land area leases. The City of Dubuque has steadily managed the land use and repurposing of industrial and waterfront sites for more than twenty years, resulting in multi-use redevelopment from the city's downtown area to the river.

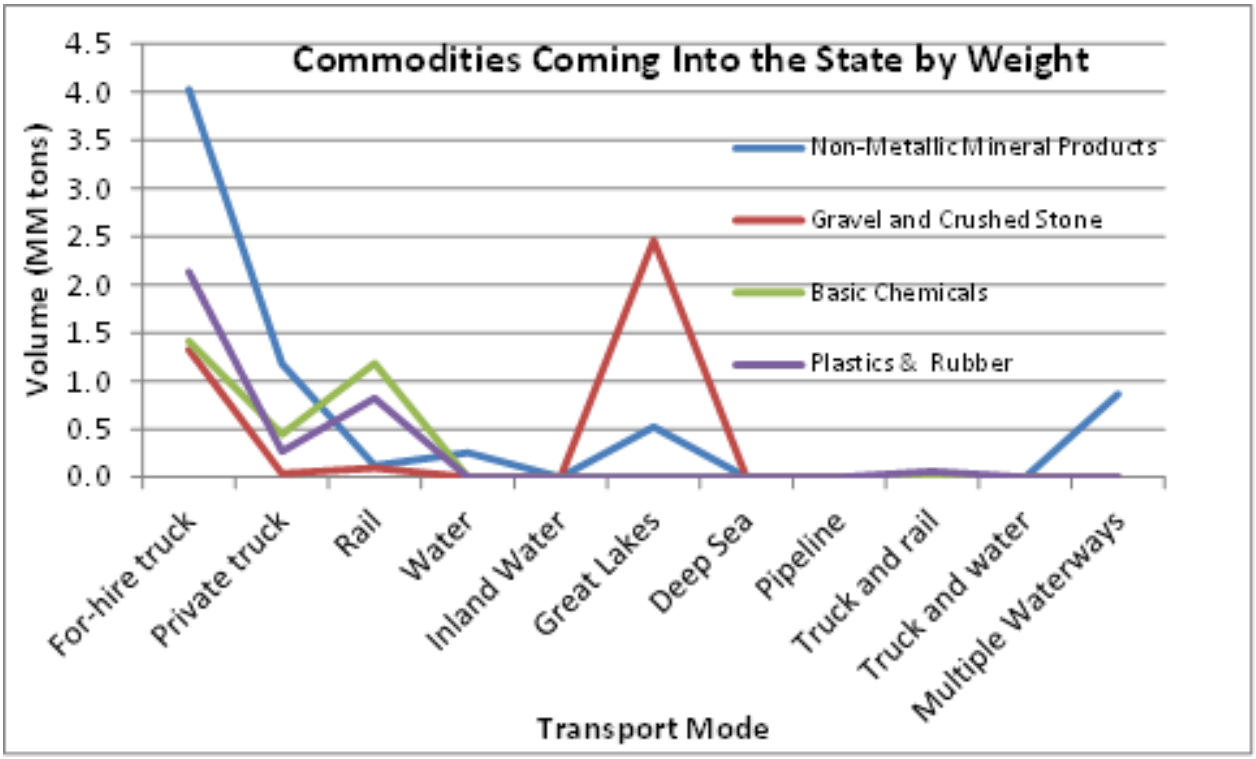
Future Markets for the Port of Milwaukee

Examining the volume and value for freight movement into Wisconsin shows a mix of product types moving into the state that may be candidates for the Port of Milwaukee to expand its markets. Available data are aggregated into broad categories and tend to lag several years behind current conditions. Based on the regional industry cluster mix and the types of materials that prove cost effective to move via vessels, two general categories emerge: mineral products and chemical products.

Figure 6 reveals commodity movements by mode into Wisconsin for two categories of bulk mineral products, gravel and crushed stone and non-metallic mineral products, along with basic chemical products and plastics and rubber. These products are used in a variety of industries in the region. Crushed gravel and stone arrives in Wisconsin primarily by lake shipment, but a significant proportion still arrives by truck, indicating room for growth for lake ports. With non-metallic minerals, trucking is by far the primary mode for transport into the state. The Port of Milwaukee could work to identify sources and end markets for these materials and work with those industries to enhance the port's profile and potential for transportation cost savings.

Bureau of Transportation Statistics data reveals, for example, that much of the gravel and crushed stone entering the state arrives from Michigan and mineral materials are particularly suitable for transport by vessel. In another example, the Port of Milwaukee could focus efforts on supplying mineral products to the pulp and paper industry, a driver industry for the state with operations centralized in the Fox and Wisconsin River valleys. This industry uses bentonite, kaolinite, calcium carbonate and talc industrial clays, all materials suitable for transport by ship and which could be handled with the port's existing facilities.

Figure 6: Commodity Movements in Wisconsin in 2013



Chemical products is another category to track over time as there is significant production capacity in the Detroit-Windsor and Cleveland-Akron areas with considerable product value coming into Wisconsin. The Milwaukee region has an established chemical manufacturing industry, which is a driver cluster for the region. The majority of chemical product inventory entering the state does so by truck and by rail. Many of these products are suitable for Great Lakes shipping, so there is potentially the possibility of some proportion of these imports to arrive at the Port of Milwaukee. Individual industries may be in a position to make use of the Port's logistical attributes and mitigate congestion in other transportation modes. For these volumes to grow and to diversify the cargoes at the Port, it will be necessary for the port administration to establish long-term relationships with these industries to understand particular needs and opportunities.

In addition to the sorts of bulk cargoes that dominate Port of Milwaukee volumes, there may be opportunities for growth in shipping finished goods and project cargoes. As described below, the Port could develop deeper relationships with regional industries to identify specific needs to identify markets.

Port Operations Analysis

Great Lakes ports operate in a dynamic environment. The Port of Milwaukee provides an important transportation service for regional industry. Overall shipping volumes on Lake Michigan are flat, and the

port controls land area in excess of its current need (although this could conceivably change with a different operating model). Using a landlord business model that features very long-term leases and focuses on staging bulk inventory for local use, the port remains a salient feature in the regional economy and market conditions have created little incentive to change operating models. As a landlord, the Port of Milwaukee allows its tenants to make long-range land use and facility decisions based on their ability to profitably utilize the city's waterfront. This model has served Milwaukee for decades.

Other regional ports, faced with evolving markets, have taken a variety of approaches to managing waterfront resources, focusing on meeting community development needs, creating a more dynamic land use management and development structure, increasing freight throughput velocity, actively maintaining relationships with regional industries and restructuring relationships with tenants to the benefit of all stakeholders. Based on shipping trends and port case study analyses, several implications for the future of Port of Milwaukee operations, infrastructure and land use needs were identified.

- The port could transition over time from its inventory storage and staging model to one maximizing freight velocity across the property. Such a change would require long term planning, benefit-cost analysis and would benefit from an expanded mandate for the port to understand and work to coordinate freight movement across a broader area (see below). Moving products through Jones Island more quickly would require identifying storage areas away from the waterfront and improving conveyance to those locations. It could potentially prevent future pressures on land use in the port area by allowing the port to reallocate land on Jones Island currently used for inventory storage. This would mean it would be unlikely, given current Great Lakes shipping trends, that the port would require major improvements to the outer harbor and also that the port could accommodate diverse uses where development opportunities exist, aligning port activities with broader community development goals. It should be clear that this would entail a major realignment of the Port of Milwaukee's operating model, and would require collaboration and leadership from a large number of public and private stakeholders.
- The Port of Milwaukee's existing landlord terminal perspective may be unable to respond efficiently to a dynamic global economy. The Port could consider revisiting its lease terms. By shortening those terms, the port could collaborate more effectively with its tenants to meet the changing needs of industries and shippers on the Great Lakes, identifying infrastructure needs and transportation network requirements, responding to markets and target industries.
- The Port of Milwaukee could actively identify key industry sectors and products suitable for shipping through the port. Based on current facilities and with staged realignments of land, infrastructure, facilities and markets, products with high potential might include:
    - Bentonite, kaolinite, calcium carbonate and talc industrial clays for use in pulp, paper and other industries.
    - Chemical products to support the region's robust chemical manufacturing cluster.
    - Finished goods and project cargoes, particularly focusing on the region's machinery manufacturing cluster.

Coordination with industry will require a potentially broader marketing strategy for the port, along with building long-term relationships with shippers, industry and end markets. Combining an active understanding of market opportunities with shorter lease terms can create a collaborative effort to more dynamically maximize the use of available waterfrontage on Jones Island for mutual profit. As part of this effort, the Port of Milwaukee could work to better optimize terminal to land transfer to truck and rail modes, gathering and tracking information about the shipment destinations, developing more effective Key Performance Indicators beyond volume and ton metrics.

- The Port's mandate could be broadened to focus on freight movement across industrial sites throughout the region, including each of the freight transport modes for the existing port and select additional identified sites, areas and corridors in the City of Milwaukee. Freight movement and understanding the needs of industry and shippers across all modes is currently not actively monitored at the city level. This would require considerable effort and leadership, but could pay benefits for industrial development throughout Milwaukee. The port may be uniquely situated to lead such a monitoring and coordination effort, given the intermodal experience of its administration. In addition to the Port of Cleveland, the St. Louis Regional Freightway is another regional example of port and freight management realignment.

Industry Outlook and the Harbor District

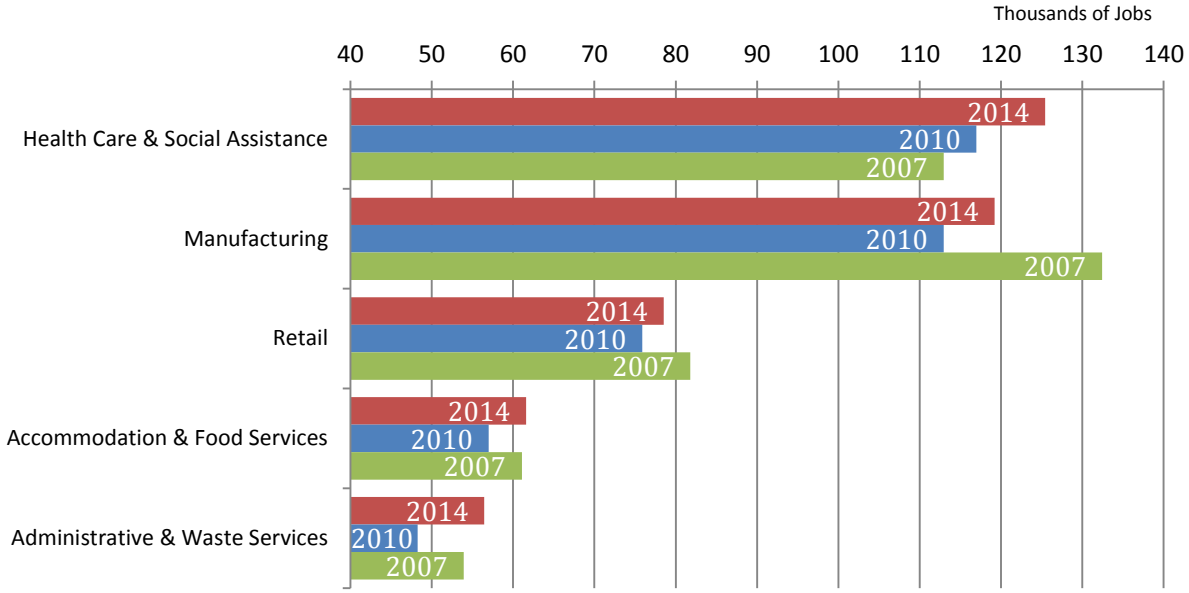
As with shipping, the industrial economy of the Harbor District exists in a complex and dynamic regional context. Any understanding of the future of the industrial economy in the District must begin with a brief overview of this context. The Milwaukee Region, defined as the four county area including Milwaukee County, Ozaukee County, Washington County, Waukesha County, is the largest metropolitan area in Wisconsin and an important driver of the State's economy. The Region contains 27% of State population and accounts for one-third of Wisconsin Gross Domestic Product, nearly 30% of total state employment, and 27% of state exports.

Figure 4: 2014 Gross Domestic Product

Industry in Milwaukee has historically been focused on manufacturing. Manufacturing developed in the region towards the end of the 19th century as foundry, machinery, and metal-working businesses settled in the area.[1] Nearly a century and a half later, manufacturing remains an important anchor of the regional economy, accounting for 75% of regional exports. Manufacturing was also the Region's largest employer before the Great Recession but has since been surpassed by health care and social assistance related sectors. Nonetheless, in 2014, manufacturing supported over 119,000 jobs, nearly 50% more than the next largest employment sector: Retail.

[1] Wisconsin Historical Society, http://www.wisconsinhistory.org/turningpoints/tp-044/?action=more_essay

Figure 5: Milwaukee Region Top Employment Sectors



While manufacturing in Milwaukee was hit hard during the recession, it lost jobs at a slower rate than the nation overall and is recovering at a similar pace. This has allowed the industry to become more concentrated in Milwaukee. Thanks to the strength of manufacturing in the region, regional exports have surpassed pre-recession levels and Milwaukee's GDP per capita remains over $10,000 higher than for Wisconsin overall. These trends highlight the importance of manufacturing in growing a region's economy.

Milwaukee's Sectors of the Future

While it is clear that manufacturing holds an important place in the Milwaukee Regional economy, to determine a reasonable allocation of land uses across the Harbor District, it is necessary to assess which industries hold the greatest future promise of economic growth and which might be attracted to the particular assets of the District. The following analysis incorporates several tiered steps to answer this question: identifying the region's existing high potential industry sectors; aligning globally enabled growth industries to Milwaukee's existing driver clusters; identifying industry sectors that view access to fresh water as an asset and aligning these to Milwaukee's driver clusters.

Figure 6: Milwaukee's Growth Sectors

Rank	Industry Subsector
1	Fabricated metal product mfg.
2	Electrical equipment & appliance mfg.
3	Social assistance
4	Management of companies & enterprises
5	Machinery mfg.
6	Educational services
7	General merchandise stores
8	Printing & related support activities (mfg.)
9	Food services & drinking places
10	Administrative & support services
11	Hospitals
12	Merchant wholesalers, durable goods
13	Insurance carriers & related activities
14	Performing arts & spectator sports
15	Leather & allied product mfg.
16	Ambulatory health care services
17	Professional & technical services
18	Specialty trade contractors
19	Food & beverage stores
20	Computer & electronic product mfg.
21	Amusements, gambling, & recreation
22	Chemical mfg.
23	Waste management & remediation services
24	Beverage & tobacco product mfg.
25	Food mfg.

Milwaukee's Growth Sectors

AECOM constructed five future-potential indicators: Employment, Employment Growth, Job Creation, Industry Concentration (Location Quotients), and Concentration Growth. These indicators were used to identify 25 subsectors key to the future of the Milwaukee Region, as shown in figure 7. The construction of each indicator is discussed below:

Employment

Annual average employment data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages (BLS QCEW) were gathered for 2010 and 2014 by three-digit North American Industry Classification System (NAICS) codes (subsector). The top 20 largest employment subsectors for 2010 and 2014 were identified and ranked.

Employment Growth

Compound annual growth rates (CAGR) from 2010 to 2014 were calculated for each subsector using the employment data gathered from the BLS QCEW. The subsectors with the top 20 growth rates were identified and ranked.

Job Creation

Net number of jobs created between 2010 and 2014 were calculated for each subsector using the employment data gathered from the BLS QCEW. The subsectors with the top 20 highest job creation were identified and ranked.

Industry Concentration (Location Quotients)

Location quotients, a calculation of the relative concentration of a given subsector in a particular region compared to in the US overall, were gathered from the BLS QCEW for 2010 and 2014 by subsector. Subsectors with the top 20 highest concentrations for each year were identified and ranked.

Industry Concentration Growth

CAGR from 2010 to 2014 were calculated for each subsector using the industry concentration data gathered from BLS QCEW. The subsectors with the top 20 growth rates were identified and ranked.

After constructing the five indicators, the 80 subsectors were ranked according to how many times they appeared in the top 20 by index. From this, 25 subsectors were identified to have strong future potential as they ranked high in three or more indicators.

Growth Sector Analysis

The 25 future subsectors with high economic growth potential are the represent the focus areas for future employment and economic production for the area. The list includes many of the industries on which the Region's economy was founded, including the manufacturing of fabricated metal products, electrical equipment, machinery, electronic products, chemicals and food and beverages. Not surprisingly, over one-third of the future subsectors are manufacturing related. Manufacturing will, therefore, remain integral to Milwaukee's success. As manufacturing continues to expand in the Region, the Harbor District can position itself to capture a portion of this growth by uniting access to labor and transportation with available, development-ready land. Milwaukee has an abundance of land zoned for industrial use; as shown below, the Harbor District may be able to position itself as particularly desirable for particular industrial sectors due to its locational assets.

Interestingly, almost half of the subsectors on which Milwaukee may be able to capitalize point towards office related employment. To continue to grow these industries and encourage organizations to locate in Milwaukee, the development of modern office space may be desirable. Demand for new office space in Milwaukee has been weak for more than a decade and lower grade office space downtown is being converted to residential uses. There is anecdotal evidence that the market is beginning to experience action on pent-up demand, with several smaller scale project announced for downtown Milwaukee. Because it is important to recognize that the Harbor District may offer distinct advantages to office employers as well as manufacturers, a more detailed evaluation of office demand is included elsewhere in this report.

Global and Local Growth Markets

Understanding which sectors hold the greatest potential for growth in the Milwaukee Region is only one step in determining which industries the Harbor District may wish to attract. The next step is to understand what end markets can support growth in these sectors and how global growth markets are

related to Milwaukee's established industry clusters. Industries with a strong presence in Milwaukee that can also participate in global growth markets have the strongest likelihood of future growth in the city and should be primary targets for any business attraction strategy. AECOM identified two local markets and fourteen global markets with the ability to support growth in several of Milwaukee's high-potential sectors. The potential in these markets is driven by technological advances and demographic trends, known as market enablers, such as 3D printing, the rise of the Internet of Things, Water Technology, and urbanization.

Each market, its ten year market potential and market enablers, and Milwaukee's sectors of the future linked to the given market are listed below and on the following page. These markets leverage Milwaukee's potential in the following eleven subsectors:

- Fabricated metal product manufacturing
- Computer & electronic product manufacturing
- Electrical equipment & appliance manufacturing
- Chemical manufacturing
- Professional & technical services
- Machinery manufacturing
- Waste management & remediation services
- Specialty trade contractors
- Food manufacturing
- Food & beverage stores
- Food services & drinking place

The following tables detail these markets and the Milwaukee industry sectors supporting their potential for growth. Figure 10 shows local markets, and figure 11 shows the global growth markets.

Figure 7: Local Growth Markets

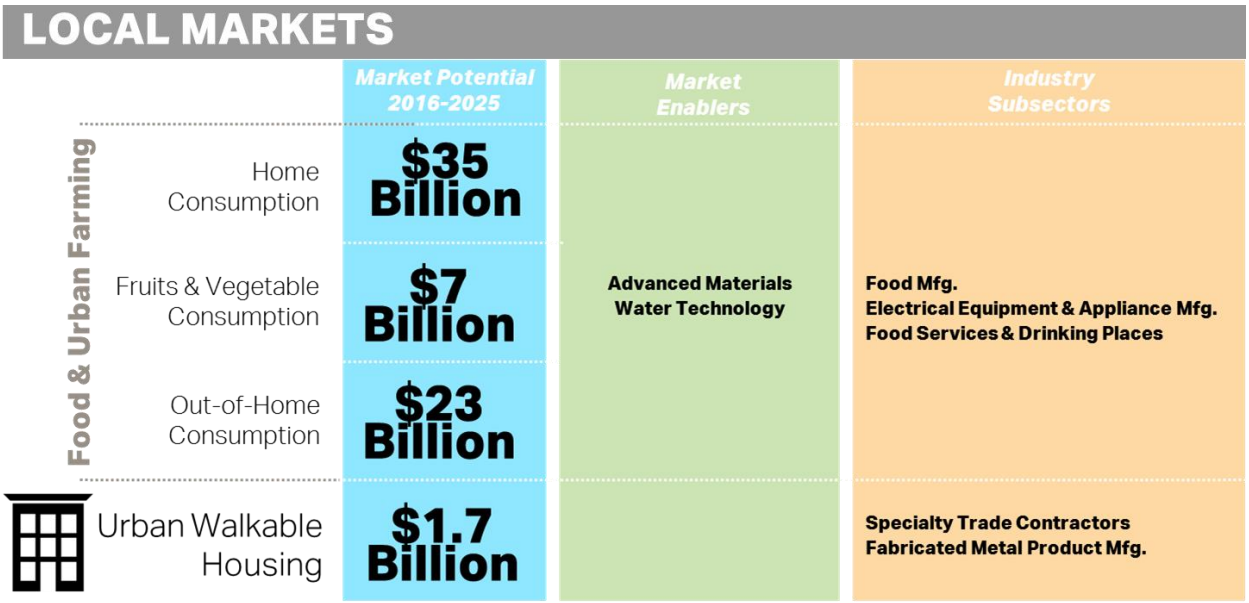


Figure 8: Global Growth Markets

GLOBAL MARKETS

	Market Potential 2016-2025	Market Enablers	Industry Subsectors
Lightweight Automotive	$34 Trillion	3D Printing Advanced Materials Advanced Sensors Internet of Things Logistics Semiconductors Water Technology	Fabricated Metal Product Mfg. Computer & Electronic Product Mfg. Electrical Equipment & Appliance Mfg.
Electric Vehicles	$3 Trillion	3D Printing Advanced Materials Logistics Semiconductors Water Technology	Fabricated Metal Product Mfg. Computer & Electronic Product Mfg. Chemical Mfg. Electrical Equipment & Appliance Mfg.
Biomedical Devices	$2.7 Trillion	3D Printing Advanced Materials Advanced Sensors Internet of Things Water Technology	Chemical Mfg. Fabricated Metal Product Mfg.
Cloud Computing	$2.3 Trillion	Big Data Analytics Internet of Things Software & Applications	Computer & Electronic Product Mfg. Professional & Technical Services
Commercial Aviation	$2.1 Trillion	3D Printing Advanced Materials Advanced Sensors Internet of Things Logistics Semiconductors Water Technology	Fabricated Metal Product Mfg.
Rail Transit	$2 Trillion	Advanced Materials Advanced Sensors Internet of Things Semiconductors Water Technology	Fabricated Metal Product Mfg. Machinery Mfg.
Renewable Energy	$1.9 Trillion	3D Printing Advanced Materials Advanced Sensors Logistics Port Semiconductors Water Technology	Chemical Mfg. Fabricated Metal Product Mfg. Machinery Mfg. Computer & Electronic Product Mfg. Electrical Equipment & Appliance Mfg. Waste Mgmt. & Remediation Services
Elevators & Escalators	$380 Billion	Advanced Materials Advanced Sensors Internet of Things Logistics	Specialty Trade Contractors Fabricated Metal Product Mfg. Computer & Electronic Product Mfg. Electrical Equipment & Appliance Mfg.
Smart Home Devices	$300 Billion	Advanced Sensors Big Data Analytics Internet of Things Software & Applications	Computer & Electronic Product Mfg. Electrical Equipment & Appliance Mfg. Professional & Technical Services
Microgrids	$270 Billion	3D Printing Advanced Materials Advanced Sensors Internet of Things Water Technology	Chemical Mfg. Machinery Mfg. Electrical Equipment & Appliance Mfg. Waste Mgmt. & Remediation Services
Autonomous Vehicles	$210 Billion	Advanced Materials Advanced Sensors Internet of Things Logistics Semiconductors Software & Applications Water Technology	Fabricated Metal Product Mfg. Computer & Electronic Product Mfg. Electrical Equipment & Application Mfg.
Wearable Technologies	$180 Billion	Advanced Sensors Big Data Analytics Internet of Things Software & Applications	Computer & Electronic Product Mfg.
Energy Storage	$150 Billion	Advanced Materials Advanced Sensors Water Technology	Chemical Mfg. Electrical Equipment & Appliance Mfg.
Drones	$100 Billion	Advanced Materials Advanced Sensors Software & Applications	Computer & Electronic Product Mfg. Electrical Equipment & Appliance Mfg.

Growth Market Analysis

The growth market analysis identifies 16 end markets in which Milwaukee's driver clusters are poised to successfully compete. These markets are strongly supported by the mainstays of Milwaukee's industrial economy, such as machinery manufacturing, chemical manufacturing, electrical equipment manufacturing and food production. All of these key industries have a presence of some kind in the Harbor District already. Food and beverage manufacturing is well represented in the Harbor District. Rockwell Automation, headquartered in the Harbor District, is a global player in several of these market categories.

While the market potentials in the local markets are much smaller than in the global, a greater share of the economic impact associated with urban farming, local food consumption, and urban walkable housing construction will be captured locally. This market could be strongly captured in the Harbor District, and this market has the potential to support a large number of well-paying blue-collar jobs. In the north end of the Harbor District and along S.1st and S. 2nd Streets, we are already seeing the development of new urban walkable housing in mixed use areas. Designating certain areas of the District to continue encouraging this trend can help further the growth of construction related jobs that has been seen in recent years with the construction of similar developments throughout the city. This would also further leverage the Region's strength in specialty trade contractors and fabricated metal product manufacturing.

However, mixed use developments, while creating higher tax value, also create fewer long-term, well-paying blue-collar jobs. These jobs are normally associated with manufacturing, which is necessary to capture benefits from many of the global markets. These markets require different land use than the identified local markets. Attracting markets relating to lightweight automotive, electric vehicles, autonomous vehicles, renewable energy, and elevators and escalators will allow Milwaukee to leverage its strength in fabricated metal product, computer and electronic product, and electrical equipment and appliance manufacturing. These subsectors not only have strong future potential, they also relate to the largest number of the identified growth markets. Preserving space in the Harbor District for manufacturing can help Milwaukee realize its potential in these markets.

All three levels of the analysis are largely dominated by manufacturing. Manufacturing has historically been a key component of the Milwaukee Region's economy allowing the region to enjoy higher-than-average per capita GDP. This trend can continue into the future by encouraging the development of manufacturing subsectors tied to the identified high-potential markets.

Specifically, the development of advanced manufacturing industries, defined as industries that apply new technological advances to improve processes and production, will spur economic growth. Two advanced manufacturing subsectors strong in Milwaukee, Computer and electronic product manufacturing and electrical equipment and appliance manufacturing, are relevant to over half of the identified markets. These findings reiterate the importance of preserving manufacturing in the region.

Furthermore, water technology enables growth in ten of the markets. The Harbor District overlaps with The Water Council's Water Technology District. The proximity to and overlap with this important cluster of water technology industries can encourage manufacturing development in the Harbor District. It

should be noted that most these industry sectors with a high potential to thrive in Milwaukee in the future, the Port and waterfront are not direct enablers. While the Port serves an important role in the identified markets in terms of raw materials and commodities, proximity to the Port only directly enables growth for the Renewable Energy market. Specifically, proximity to the Port can allow easier and cheaper freight and barge shipment of wind turbine components. The potential for industries associated with freshwater access is examined in the next section.

Water as an Industry Asset

The Harbor District's unique location on the waterfront may be seen as a distinct advantage to certain manufacturing industries. The attractive power of the waterfront is manifest in two ways: for industries with high water use as a production input, and industries which ship and receive by water. In order to determine what these industries are AECOM used IMPLAN, an input/output model which contains detailed information on the interactions of various sectors within a specified economic region. From IMPLAN, AECOM looked at two variables: the amount of water transportation and the amount of water utilities used as inputs in manufacturing and food production in the United States. Starting with a list of 282 industries, AECOM ranked 52 industries that demanded the most water transportation and water utilities and for which water transportation and water utilities accounted for the largest share of production inputs. These water intensive industries are shown on the tables on the following pages.

While these 52 industries may find the Harbor District's water resources attractive, not all 52 of these industries take advantage of the manufacturing strengths of the Milwaukee Region. Industries that take advantage of the region's manufacturing base will find the Harbor District location more appealing than those industries that do not. Of the 52 identified water intensive industries, 17 overlap with the identified Milwaukee growth sectors. The tables on the next pages identify these 17 industries in yellow. Industries with high demand for both water utilities and water transportations, as well as a link to Milwaukee growth sectors are considered high potential industries. Industries with a high demand for one of the water variables, as well as a link to Milwaukee growth sectors are considered medium potential industries.

Figure 12: Water Use Industries Linked to Milwaukee Clusters

Rank	Industry	Water Utility	Water Transportation	Milwaukee Growth Sector
1	Iron and steel mills and ferroalloy mfg.	x	x	
2	Travel trailer and camper mfg.	x		
3	Flour milling and malt mfg.		x	
4	Motor home mfg.	x		
5	Poultry processing	x		Food mfg.
6	Distilleries		x	Beverage and tobacco product mfg.
7	Petroleum refineries	x	x	
8	Electric power generation, transmission, and distribution	x	x	
9	Tire mfg.	x		
10	Breakfast cereal mfg.		x	Food mfg.
11	Motor vehicle parts mfg.	x	x	
12	Wood kitchen cabinet and countertop mfg.	x		
13	Secondary smelting and alloying of aluminum		x	
14	Leather and hide tanning and finishing	x		Leather and allied product mfg.
15	Ground or treated mineral and earth mfg.		x	
16	Other animal food mfg.		x	
17	Pulp mills	x		
18	Petrochemical mfg.	x	x	Chemical mfg.

High Potential | Medium Potential

Rank	Industry	Water Utility	Water Transportation	Milwaukee Growth Sector
19	Soybean and other oilseed processing		x	
20	Ferrous metal foundries	x		
21	Pharmaceutical preparation mfg.	x		Chemical mfg.
22	Cookie, cracker, and pasta mfg.		x	Food mfg.
23	Wet corn milling	x	x	
24	Bread and bakery product mfg.	x		Food mfg.
25	Other basic organic chemical mfg.	x	x	Chemical mfg.
26	Beet sugar mfg.		x	Food mfg.
27	Mineral wool mfg.	x		
28	Paper mills	x		
29	Paint and coating mfg.	x		Chemical mfg.
30	Semiconductor and related device mfg.	x	x	Computer and electronic product mfg.
31	Copper rolling, drawing, extruding and alloying		x	
32	Carbon and graphite product mfg.		x	Electrical equipment and appliance mfg.
33	All other basic inorganic chemical mfg.	x		Chemical mfg.
34	All other miscellaneous wood product mfg.	x		
35	Lime and gypsum product mfg.		x	
36	Nonferrous metal foundries	x		

High Potential | Medium Potential

Rank	Industry	Water Utility	Water Transportation	Milwaukee Growth Sector
37	Ready-mix concrete mfg.		x	
38	Other pressed and blown glass and glassware mfg.	x		
39	Aircraft mfg.		x	
40	Asphalt shingle and coating materials mfg.		x	
41	Cut stone and stone product mfg.		x	
42	Fluid milk and butter mfg.	x		Food mfg.
43	Sign mfg.	x		
44	Aluminum product mfg. from purchased aluminum		x	
45	Carbon black mfg.		x	Chemical mfg.
46	Primary smelting and refining of copper		x	
47	Snack food mfg.		x	Food mfg.
48	Knit fabric mills	x		
49	Soft drink and ice mfg.	x		Beverage and tobacco product mfg.
50	Steel product mfg. from purchased steel		x	
51	Cement mfg.		x	
52	Dairy cattle and milk production		x	

High Potential | Medium Potential

Water Use Industries Analysis

Milwaukee has wisely shifted its economic development strategy away from "smokestack chasing" to a cluster-based approach. This analysis has revealed 17 industry sectors that rely on large quantities of water in their production processes or for shipment or for both and, critically, are aligned to the industry clusters that drive Milwaukee's economy. There is a potential for these sectors to be attracted to the Harbor District and to capitalize on the city's workforce and supply chaining and local knowledge of end markets:

- Poultry processing
- Distilleries
- Breakfast cereal manufacturing
- Leather tanning
- Petrochemical manufacturing
- Cookie, cracker and pasta manufacturing
- Bread making and bakeries
- Organic chemical manufacturing
- Beet sugar manufacturing
- Paint and coating manufacturing
- Semiconductor manufacturing
- Carbon and graphite products
- Inorganic chemical manufacturing
- Milk and butter production
- Carbon black manufacturing
- Snack food manufacturing
- Soft drink manufacturing

Nine of these sectors are related to food and beverage manufacturing, an industry sector strongly represented in the District and identified as a primary target sector in several recent plans. Grain products are handled regularly at the Port of Milwaukee. Other sectors are related to chemical manufacturing, a driver cluster in the region and one whose raw materials were identified as ideal candidates for ship-borne transportation, with strong supply chains located around the Great Lakes. It may be possible to attract these industries to the Harbor District.

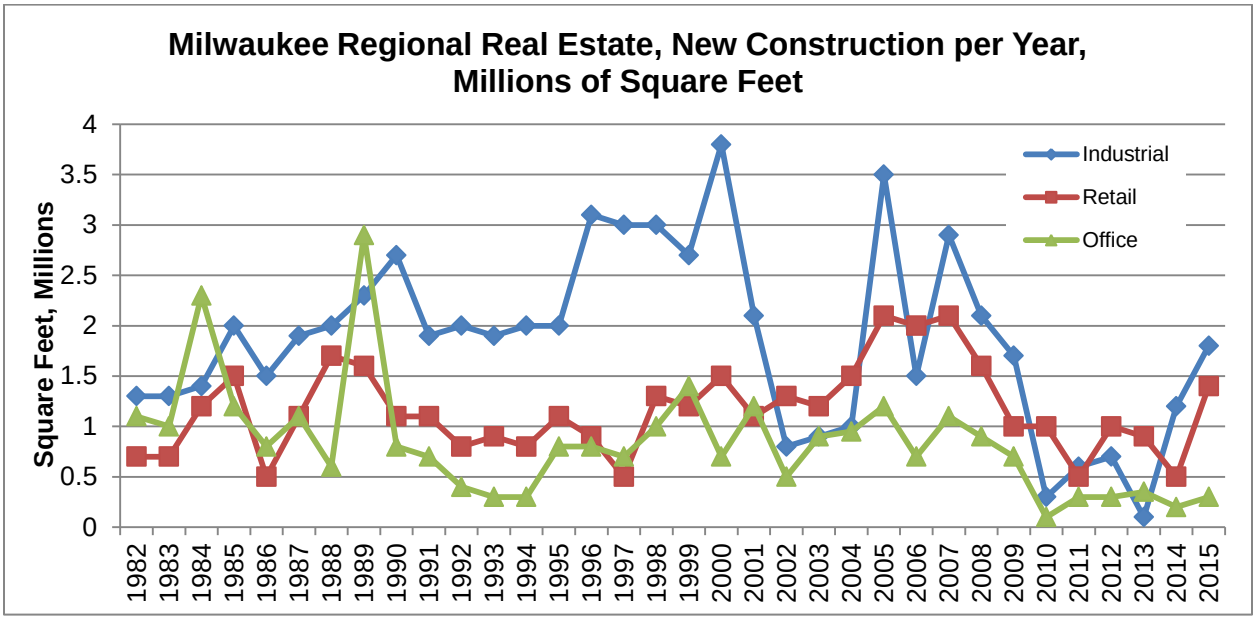
It should be noted that underutilized industrial sites are in strong supply across many Great Lakes waterfronts. The business sectors identified here do not necessarily need to be located on the water – they operate more efficiently with abundant supplies of fresh water (from water utilities) and with access to vessel shipping. That is to say, the Harbor District is competing with not only other waterfront cities to lure these industries, but with non-waterfront sites as well, in the city and in the region. Land demand is examined in the following section, but for the Harbor District to attract these uses or other redevelopment of brownfield sites, significant investment is site preparation will be required. This will include addressing cleanup and liability, trucking access and other issues to create "shovel-ready" development opportunities. Additionally, the District will have to craft a narrative – such as the Freshwater Campus at Reed Street Yards or the story of visionary urban redevelopment that attracts businesses to the Menomonee Valley – in order to set itself apart from the similar areas across the region.

Industrial, Retail and Office Real Estate Markets

While a large proportion of land area in the Harbor District is zoned for industrial use, overall the area is home to concentrations of office and retail uses as well. As noted above, more than half of Milwaukee's growth industries are in commercial and professional service and other office-based sectors. At an aggregate level, planning for the Harbor District will unfold in context with regional real estate trends in

office, retail, and industrial/flex segments. The following chart provides context as to the long term trajectories for annual new construction of retail, office, and industrial / flex space from 1982 to 2015, in millions of square feet.

Figure 13: Real Estate Trends



New construction has been trending downward since the 2000 for industrial and office development, and since 2005 for retail, with upticks across industrial and retail in the last two years. Since 2007, the City of Milwaukee has captured about 20% of regional office development, 11% of new retail development and 15% of industrial/flex construction. Trends of note for the region include:

- Regional retail markets have recovered to their pre-recession annual average of about 1.2 million square feet per year. In terms of land absorption, this pace of absorption would correlate with demand for stand-alone single story retail demand for between 70 and 80 acres of land per year for new construction, with lot coverage assumed at 35%.

- Regional industrial markets have recovered strongly, to a pace of about 1.8 million square feet per year, which is still below the 20-year average of about 2.1 million square feet per year in new construction. In terms of land absorption, this pace of absorption would correlate with demand for between 120 and 130 acres of land per year for new construction, assuming lot coverage of 35%.

- Office markets are lagging well behind long term averages (pre-recession pace of just under 1 million square feet per year). Since 2008, the regional office market has seen new construction at a pace of about 400,000 square feet per year. Assuming lot coverage at 28%, this pace would yield overall absorption of about 32 acres per year. For the Harbor District, office space would likely be built at higher lot coverage percentages to match the urban character of the area, with floor to area ratios that could range from 2.0 to 6.0 (i.e. building area larger than land area by a

factor of 2 to 6). As such, for the Harbor District to capture 20% of regional office demand over a 10-year period (800,000 square feet) – that is *all* office development for the city -- related land requirements could range between 7 and 10 acres.

Real Estate Market Analysis

For additional perspective, the following summary provides insight into the share of new regional real estate construction captured by the City of Milwaukee since 2007:

Industrial / Flex

- Region: Growth in total inventory of 5.6 million square feet from 2007 to 2015, and an increase in occupied inventory of 6.1 million square feet, or about 675,000 occupied square feet per year. As space is being built faster than it is being leased, regional vacancy rates are increasing slightly. In the first quarter of 2016, the vacancy rate for industrial space was 6.4%, up 0.9% from the year previous.

- City of Milwaukee: Growth in total inventory of about 825,000 square feet from 2007 to 2015; and a decrease in occupied inventory of 702,000 square feet over the same period. As space is being built faster than it is being leased up, vacancy has increased slightly. Initial trends for 2016 suggest that supply and demand for the city industrial market are moving into alignment.

Retail

- Region: Growth in total inventory of 6.7 million square feet from 2007 to 2015, and an increase in occupied inventory of 6.2 million square feet, or about 691,000 occupied square feet per year. As space is being leased up as fast or faster than it is being built, regional vacancy rates declined from 2007 to 2015, and have held steady since. The vacancy rate for retail space was 6.8% in the first quarter of 2016, up 0.1% from the prior year.

- City of Milwaukee: Growth in total inventory of about 715,000 square feet from 2007 to 2015; and an increase of 456,000 square feet in occupied inventory over the same period. As space is being leased faster slightly than it is being built, vacancy has decreased slightly.

Office

- Region: Growth in total inventory of 2.6 million square feet from 2007 to 2015, and an increase in occupied inventory of 2.3 million square feet, or about 260,000 occupied square feet per year. Vacancy rates have decreased slightly over this period, and have held steady since. The office vacancy rate in the first quarter of 2016 was 9.6%, the same as the year prior.

- City of Milwaukee: Growth in total inventory of about 530,000 square feet from 2007 to 2015; and an increase of 425,000 square feet in occupied inventory over the same period. Vacancy rates have decreased slightly over the period.

Set in this regional context of relatively low demand for new construction, slow recovery from the recession, and rising vacancy rates, the proportion of new construction for commercial real estate captured by the City of Milwaukee is relatively modest. The fraction of that proportion able to be captured by the Harbor District is therefore likely to be modest as well. Underutilized waterfront industrial land is available in many cities on the Great Lakes (and throughout the country). Over the very long term, however, waterfront land for uses other than industry will likely to be able to command premium values, as developable urban waterfront sites are unique and relatively rare. The assets provided by the waterfront locations are, for office, retail and residential development, primarily aesthetic, but Milwaukee (and other cities as detailed in the redevelopment case studies below) have capitalized on waterfront locations for high-value redevelopment of formerly industrial sites.

These weak demand trends are applicable to all scales of office, laboratory and flex space. There is an abundant supply of relatively inexpensive industrial and flex space in existing buildings in the Harbor District. Business operators and developers report a need for scale-up flex space for growing start-up businesses. This space could be used for laboratory needs or combining retail with production and could be set in mix of uses. Some area business owners are adamant that in order to grow they are not seeking incubator services, but rather inexpensive, easily divisible spaces as small as 4,000 square feet that can be easily expanded as they grow. The “freshwater technology” incubation services that are located near Reed Street Yards could be connected with a development of this kind to provide an interim step for growing businesses. Similarly, an “innovation district” has been proposed (and loosely defined) in other area plans. A scale-up flex development could presumably meet the needs of technology or creative businesses. Set in the overall context of business development and real estate in Milwaukee, demand for such spaces is likely to remain modest, but investment in this type of development in the District could provide an invaluable service in growing the area’s job base and entrepreneurial economy. Proximity to the waterfront – though not necessary for business purposes – typically has an additional attractive force as an amenity -- as noted in the discussion of office, retail and residential uses above – especially if such a development is undertaken in a mixed-use neighborhood context.

Waterfront Development Case Studies

After a review of over 20 cities with former or transitioning industrial waterfronts, four examples were chosen as exemplars of waterfront development applicable to Milwaukee's Harbor District: Auckland, New Zealand; Camden, New Jersey; Cleveland, Ohio; and Hamilton, Ontario. While these waterfronts are at varying phases of implementation of redevelopment planning, each city has taken bold and innovative steps toward reimagining its waterfront through land use changes, catalytic projects, and strategic partnering. Figure 14 demonstrates a brief rationale for the selection of each waterfront alternative.

Figure 9: Case Study Selection

Preliminary Candidates	Final Selections	Rationale
Auckland, New Zealand **Baltimore, MD** **Bellingham, WA** **Buffalo, NY** **Camden, NJ** **Cleveland, OH** **Hamilton, ON** **Harrison, NJ** **Havana , Cuba** **Kaohsiung, Taiwan** **La Crosse, WI** **Marquette, MI** **Oakland, CA** **Pittsburgh, PA** **Portland, OR** **Rotterdam, The Netherlands** **Seattle, WA** **Toronto, ON** **Vancouver, WA** **Vancouver, BC**	Auckland, New Zealand	• Impressive investments in the public realm • Heavy manufacturing industries declined but stable marine industries supported • Strong support across all government levels and private sector • Innovative urban design • Largely upheld as a world-class waterfront
	Camden, NJ	• Strong example of successful public-private partnerships • Significant brownfield redevelopment • Key leadership from nonprofit sector • Emphasis on neighborhood planning on and adjacent to waterfront
	Cleveland, OH	• Comprehensive support from City departments • Ambitious well-thought out plan; fair amount of infill development [not starting from scratch]; connects to other established destinations (Browns Stadium, Science Center, Rock Hall, Convention Center)
	Hamilton, ON	• Emphasis on public investments as a driver of development • Development almost entirely led by city; waterfront lands are completely owned and controlled by the City of Hamilton • Building upon development momentum begun in the early 1990s. • City absorbed most of the remediation and cleanup of former industrial sites to make development-ready

Planning & Development History

In an effort to better understand the planning implications of each case study waterfront on the WaLUP, the team conducted a review of the planning and initiatives that led to successful development in these cities. The following includes an organizational overview of the lead developing agency, a brief timeline of planning and development, and a snapshot of the land use before and after development.

Auckland, New Zealand

Prior to 2010, much of the development on the Auckland, New Zealand waterfront was pieced together through public-private partnerships between the former Auckland City Council, the port company, and various subsidiaries and developers. Upon the organization of the Auckland [regional] Council in 2010, the Auckland Waterfront Development Agency (i.e., Waterfront Auckland) was commissioned to "lead a strategic approach to development across the waterfront" through a thorough and comprehensive planning process. Building upon $120 million of projects completed between 2007 and 2012, in advance of the 2011 Rugby World Cup, the 2012 Waterfront Plan set a new tone for public and private development along Auckland's waterfront. The recent success of Waterfront Auckland has been so profound that the organization was expanded to plan development for the entire region under the banner of Panuku Development Auckland.

Historically, two major industry sectors dominated the waterfront: marine uses such as fishing, boating, and cruises and petrochemical manufacturing. The extensive marine sector was identified as a home to vital industries, but the waterfront lacked connectivity both between industries and to the surrounding communities. The petrochemical sector was largely viewed as a residual, terminal industry. Through the planning process, the council decided to deemphasize and phase out petrochemical uses on the waterfront.

As planning efforts began in 1998, the Auckland waterfront was largely known as a seedy area with crime and industrial pollution leaving the land largely vacant and blighted. Still, the waterfront was a short 5-minute walk from the central business district (CBD). In the late 1990s, efforts began to convert the Wynyard Quarter to mixed-use. At the time, the land was leased primarily from the port company. Development was initiated through statutory support and channelizing funding toward public infrastructure investments. This, in turn, catalyzed private development mostly in the form of retail and FaB (food and beverage) firms. A strong emphasis was placed on telling the story of the waterfront and establishing the desired public outcomes.

Building upon newfound interest and access to the waterfront, the City began to rezone the waterfront and implement a number of catalytic projects. Two key drivers included the Americas Cup in 2000 and the Rugby World Cup in 2011 which spurred development of stadiums, retail, and hotels on the waterfront. Today, Panuku Development Auckland continues to implement the 2012 Waterfront Plan which includes five key waterfront goals including a Blue-Green Waterfront, a Public Waterfront, a Smart Working Waterfront, a Connected Waterfront, and a Livable Waterfront. The plan emphasizes public access and encourages mixed-use commercial and residential, along with marine industrial uses.

Camden, New Jersey

Redevelopment in Camden, New Jersey, across the Delaware River from Philadelphia, has been largely driven by the nonprofit sector. The Cooper's Ferry Partnership (CFP) was created in the early 1980s as a nonprofit organization with a public-private partnership focus on economic development. Its board membership is diverse and includes elected officials, foundations, local businesses, large corporations, and other major Camden institutions. Over the course of the CFP's focus has shifted from public economic development to neighborhood planning to policy advocacy at the state level. In each shift, it

has built upon and retained its previous focus. Through its decades of success, the CFP has led and organized much of Camden's waterfront redevelopment.

Historically, Camden's waterfront was occupied by industrial manufacturing land uses most notably RCA Victor and Campbell's Soup. These areas consisted of large superblocks (i.e., four-square blocks and larger) with very little public infrastructure. As with many U.S. cities, Camden experience significant deindustrialization resulting in much of its waterfront remaining vacant for the second half of the 20th Century.

Beginning in the 1980s, the City of Camden began to plan for redeveloping and revitalizing its waterfront by creating a master plan largely based on the Baltimore Inner Harbor model. The CFP played a key role in the planning and fundraising. Today, the Central Waterfront (and Cooper-Grant neighborhood) is home to several key public institutional anchors including the Adventure Aquarium, Campbell's Field, Susquehanna Bank Center, and USS New Jersey battleship. Surrounding these institutions are other entertainment venues, one million sq. ft. of office space, and other mixed residential uses. There are also several large public and outdoor recreational destinations. The working port and other industrial uses are found largely undisturbed in the Waterfront South, south of Clinton Street.

Cleveland, Ohio

Redeveloping the waterfront in Cleveland, Ohio has been largely led by the Cleveland City Planning Commission through its Waterfront District Plan, adopted in 2004. However, the plan's vision has its roots in the City's 1903 Burnham "Great White City" plan, which called for a mixed-use, publicly accessible lakefront. This return to the lakefront as a public destination has been widely embraced by the city leadership, developers, and anchor institutions such as the Cleveland Browns and the Rock and Roll Hall of Fame.

In contrast to many of the other case study cities, a majority of industrial land uses did not locate on the waterfront in Cleveland due to topography challenges. Instead, the lakefront was largely preserved for open space, recreational and entertainment destinations, and transportation uses such as marinas, highways, and a small airport. Most of Cleveland's industry developed in "the flats" along the riverbed. Prior to redevelopment, the waterfront was light industrial and mixed-use, dominated by public spaces, anchor institutions, and a lakefront airport. The Port was the only heavy industrial use on the lakefront.

Historically, manufacturing was a strong backbone of Cleveland's economy primarily in steel and other metal manufacturing. However, as were most Rust Belt cities, Cleveland was hit particularly hard by deindustrialization in the second half of the 20th Century. Recent success in turning around the regional economy through economic development and redevelopment has earned Cleveland the nickname the Comeback City. Much of this success can be attributed to efforts in diversifying the economy in addition to the manufacturing sector by attracting key employers in the technology and healthcare sectors. Furthermore, the redevelopment efforts, particularly infill, have played an important role in turning around Cleveland's real estate market despite downward trends during the Great Recession.

In addition to adopting the waterfront district plan in 2004, key efforts have included the 2006 rehabilitation of the former U.S. Coast Guard station, the 2006 master plan for Dike 14 (a Confined Disposal Facility), the 2009 North Coast Harbor Pedestrian Bridge, and the 2012 Downtown Lakefront Plan. Other recent initiatives under development include the Flats East Bank mixed-use residential development, Canal Basin Park connection to the Towpath Trail, and a new convention center directly linked to the harborfront.

Much of the successful redevelopment along the waterfront can be credited to key investments around anchor institutions including the Rock and Roll Hall of Fame, the Browns Stadium, and the Science Center. These uses lent themselves readily to mixed-use development and public spaces and attained immediate buy-in and support from key stakeholders and the public. Furthermore, the Port of Cleveland has been a strong ally in promoting the plan and development. In many cases the port itself has acted as the developing authority. Lastly, two major projects catalyzed development: reconfiguration of the West Shoreway, which improved public access to the lakefront; and downtown redevelopment with a focus on mixed uses and public spaces.

Hamilton, Ontario

Planning for the Hamilton, Ontario waterfront began in the 1950s in an effort to reduce pollution and improve water quality of the Great Lakes. By the 1980s, the City of Hamilton had become the lead agency striving to rejuvenate the waterfront largely through rehabilitating publicly-owned properties and creating public amenities. As the city amalgamated with surrounding jurisdictions in the early 2000s, newfound opportunities became apparent largely through leasing and land transfers from the Port Authority to the city. Today, the City of Hamilton continues to build on decades of public investment on its waterfront in accordance with its Secondary Plan (i.e., comprehensive plan) and it is seen as the major driver of development in the region.

Hamilton has essentially two waterfronts. Its Lake Ontario waterfront consists of shoreline parks, beaches, and recreational spaces, and it is located far from downtown Hamilton. The central business district (CBD) and Hamilton Bay waterfront are sandwiched between Highway 403 and the Queen Elizabeth Way. The West Harbour waterfront area historically supported light and heavy industry, but it fell into disuse in the second half of the 20th Century. Much of the former industrial land remained contaminated from previous uses and areas along the West Harbour waterfront did not have municipal services. The surrounding neighborhoods are very low-income with old housing stock. They were historically the entry point for workers at nearby industries. They are characteristic of a transition area between the former industrial waterfront and the CBD and more stable residential neighborhoods.

Redevelopment along Hamilton's waterfront largely began when the local and provincial governments cooperated to remediate a filled landfill and turn the site into a Bayfront Park. The primary goal was to bring people back to the waterfront with an additional focus on rehabilitating the land and improving water quality. Specific investments included passive recreation space, trails, and a boat launch. Throughout the 1990s and early 2000s, the City of Hamilton continued to acquire and remediate waterfront properties including several unused industrial properties. In addition to providing public destinations such as boating and yacht clubs, the city engineered and naturalized the pier and

constructed a beach. During the 2000s, the City also acquired three additional industrial piers and, in 2005, it began to comprehensively plan for its waterfront redevelopment through its Secondary Plan. The plan was much more prescriptive than previous plans (e.g., plans focusing on zoning changes) and it includes strong urban design elements. The local neighborhood associations played an important role in drafting the plan. The former industrial piers are currently being planned and redeveloped for mixed use commercial and residential and the City anticipates spending $50 million between 2012 and 2018 to subdivide and bring municipal services to the areas.

Redevelopment Case Study Analysis

The case studies produced valuable information that can help guide both planning and implementation of redevelopment in the Harbor District. Particular focus was paid to the following information:

- Before and after conditions
- Selection of preferred land uses
- Land uses that could only occur on the waterfront
- Compatibility with other uses
- Strategies employed
- Financing
- Key partnerships
- Lessons learned

Findings are summarized in the points below, which include a discussion of implications for planning in Milwaukee.

Invest in the public realm first.

The most consistent finding across the case studies was the emphasis on investing in the public realm first and foremost. In most cases, public investments first involved purchasing or converting publicly-owned property and establishing public spaces such as parks, linear park, or other recreational spaces. In all cases, the intent was to simply give people a place to interact with the waterfront.

The leadership at all of the waterfronts stressed the importance of prioritizing equity in public investments. The representatives unanimously agreed that access to the waterfront much be made for all people. As one interviewee said, “[the plan] is an effort to showcase the city, instill a sense of ownership for residents and supporters, and show equitable investments of public money.” Another noted, “Had we put in mixed-use and residential first, there would have been a revolution. The public would not give up their waterfront.”

In many cases, the lead development authority (e.g., city or development organization) also proactively brought municipal services and infrastructure to parcels and led land assemblage and subdividing. In Hamilton, the city essentially viewed itself as a developer with typical landowner responsibilities. This allowed the city to retain the ability to sell land at a premium price and accelerate development on a desired timeline. In addition to infrastructure investments, many of these cities also absorbed the cost of rehabilitation and remediating properties in advance of development whether public or private.

Establish a hard line between industrial and public spaces.

Many of the case studies started with an area with stagnant industry and underutilized land uses. In almost every case, authorities established a clear line between public and industrial uses. In Cleveland, it

appears that a variety of land uses live in harmony; however, other cities desired to send a clear signal to the market that the public waterfront was no longer a place for heavy industries that do not require water access.

In Camden, the port and much of the heavier industry was largely isolated from the Central Waterfront, separated by a natural delineator in Clinton Street. Hamilton's waterfront took a bolder stance and indicated that a hard boundary would be established between industrial and public uses. Industries would be transitioned out of the West Harbour and encouraged to gravitate toward the Bayfront industrial area near US Steel and Arcelor Mittal plants and the port. While the City of Hamilton did not directly relocate firms, it made its intent clear in the waterfront plan and through public engagement activities. It is too early to determine whether firms will move due to these decisions.

In Auckland, the plan indicated that the petrochemical industry sector was in decline, and that these uses would be transitioned out of the waterfront. However, Waterfront Auckland recognized that marine industrial uses such as fishing, yachting, and tourism required water access. As such, the plan reflected the need for an integrated working waterfront with clearly demarcated space where marine (and port) operations and public access could coexist.

After public access, mixed-use and residential uses are preferred.

Representatives from each waterfront agreed that mixed-use commercial and residential was highly desired once public anchor institutions have been established. Many also insisted that it was imperative that public investments set the tone for private development. Particularly in Auckland and Hamilton, representatives noted that it was crucial for the development authorities to signal their expectations of the market through establishing certainty and by indicating their long-term commitment to their respective plans. In Auckland, this meant entering into 125-year leases and working with key stakeholders and trade associations when discussing zoning and development agreements. Similarly, officials in Camden and Hamilton stressed the importance of fostering a cooperative atmosphere between public and private developers by making desired outcomes clear in the plans and development agreements.

It should be noted that while mixed-use commercial and residential were preferred land uses in all of the case studies, office uses on the waterfront seem to be a point of contention in some cities. In Camden, over 1 million square feet of office space was added to the Central Waterfront with another 2 million square feet proposed for 2019. In contrast, the City of Hamilton specifically prohibited office uses in the West Harbour plan in fear that doing so would compete with the central business district.

Build upon anchor institutions and catalytic events.

In most of the case studies, public and private investments capitalized on key existing anchor institutions including regional parks, stadiums, museums, and other major public venues. In addition to encouraging greater initial buy-in and consensus toward new developments, working with existing institutions was important in respecting the history and telling the story of the waterfront. Recognizing key partners in establishing the identity of each waterfront proved to be crucial in finding the balance of what is left alone and what becomes new.

Interestingly, three of the four cities hosted prominent events that helped catalyze development along the respective waterfronts. The most recent development in Auckland was bookended by the American Cup in 2000 and the Rugby World Cup in 2011. Hamilton hosted events for the 2015 Pan Am Game after negotiating a new stadium on former industrial land. Lastly, Cleveland aims to redevelop much if its waterfront in advance of the Republican National Conference in July 2016.

Forge strong, diverse partnerships.

Development authorities stressed that none of their successes would have been possible without healthy and diverse partnerships between governments, neighborhood organizations, trade associations, private developers, and, most importantly, the public. Not only was championing a diverse supporter base good for public relations, it also proved helpful in financing, obtaining regulatory approvals, and in drafting development agreements.

In some cases, the development authorities did not stop their partnerships in development and planning, but also embraced leading programming at public spaces. In particular, the Cooper's Ferry Partnership in Camden and Waterfront Auckland intentionally act as the activity manager for their respective waterfronts, controlling event programming, popup activities, and other activation strategies. Both of these organizations emphasized that programming the space directly informs their ability to control the narrative of the waterfront and continue to act as a unifying agent as development continues.

Be patient.

Lastly, virtually all of representatives that spoke with AECOM staff emphasized that there are no shortcuts to redeveloping former industrial waterfronts. In every case, the successes seen today were at least 20 to 30 years in the making. These individuals noted that the process begins fostering key partnerships and years of public involvement. In fact, one interviewee stressed that public involvement alone should be allotted 12 to 18 months for each major project.

Be Open to Innovation

The case studies revealed key innovations employed in waterfront redevelopment.

- Waterfront Auckland has structured leaseholds with 125-year terms, covered by an upfront payment, for 500 to 600 new residential properties in an effort to show their long-term commitment to the vision presented in the waterfront plan. It is an indication to the market that investments need to be sustainable and built upon trust between partners. It should be noted that this does not refer to port tenants, but rather to developers in the areas where land use is changing from industrial to other uses.
- In Camden, employment tax credits are being supported for firms willing to relocate on the condition that a certain number of jobs are incrementally guaranteed over the term of the credit. For example, the Philadelphia 76ers relocated their corporate offices and built a new practice facility in Camden. The team committed to maintaining 250 jobs in return for $82 million in tax credits over 10 years.

- The City of Cleveland has focused infrastructure and public-realm investments to spur private development. A major roadway realignment project has improved access to the lake for neighborhoods that were previously cut off from the shore, and investments around the city's anchor institutions helped create public buy-in and excitement immediately. Additionally, as noted in the port operations case studies, the Port of Cleveland restored a CDF as public greenspace and habitat, drawing visitors to the working waterfront.
- The City of Hamilton offers a number of options to help in brownfield redevelopment including a waterfront-specific remediation loan program, the ERASE (Environmental Remediation and Site Enhancement) Redevelopment Grant Program, and other remediation tax incremental financing tools.

Summary of Findings, Analysis and Implications for Planning

The findings of this market analysis provide clear guidance in making decisions about future land uses in the Harbor District. Used in conjunction with the values and goals and District stakeholders and the opportunities and constraints identified in the existing conditions analysis, the economic outlook described in this document established a basis for prioritizing particular land uses in particular precincts in the Harbor District. The implications for Land and Water Use planning are summarized here.

1. **The Harbor District is economically productive.** The Harbor District is home to thousands of jobs across a variety of sectors and features land values higher than the average for the City of Milwaukee. Growth and redevelopment pressures are starting to become obvious in the northern end of the District, but much of the area is relatively stable. In many areas in the Harbor District, the impetus to change land uses will not be entirely market driven, but will rather respond to the vision of stakeholders. This statement is also true for operations at the Port of Milwaukee. The port serves an important economic function and has maintained a stable income stream, generating direct value for the city, in a long era of relative market stasis for lake transportation.
2. **The Harbor District is home to thousands of jobs, but not many workers employed there live in adjacent neighborhoods.** As noted in the existing conditions characterization, only 10% of District employees live in the immediately surrounding zip codes. The District is not an employment hub for neighborhood workers. Jobs in the District are heavily weighted toward industrial sectors, and neighboring employees are no more likely to work in manufacturing than is the regional workforce as a whole. This may indicate that there is room for growth in manufacturing employment for neighborhood worker. On the labor supply side of that equation, workers in the Walker's Point neighborhood are continuing to lose economic ground, at least to some degree due to the erosion of family-supporting manufacturing jobs open to workers with relatively low educational attainment. The relative youth of workers in this neighborhood could supply a pool of potential workers for increased manufacturing employment in the Harbor District.
3. **There is a future for industrial activity in Milwaukee and in the Harbor District.** Historically, Milwaukee's economy has been centered on manufacturing. The analysis of growth sectors on which Milwaukee may be able to capitalize includes many of the industries on which the city's economy was founded, including the manufacture of fabricated metal products, electrical equipment, machinery, electronic products, chemicals and food and beverages. These industries are currently strong in Milwaukee, and as they grow and consolidate in the region, some of that activity can be captured in the Harbor District as long as the proper conditions are created, uniting access to labor and transportation with available, development-ready land. Enabled by technological advances, particular growth markets have been identified in lightweight automotive parts, electric vehicles, biomedical devices, rail transit, renewable energy and energy storage, along with food production and urban farming and the construction or urban walkable housing, among others. It may be possible for the Harbor District to support the growth of some of these industries. It should be noted that the District offers key ingredients for industrial redevelopment: land, strong utility infrastructure (including steam in some areas), multi-modal freight access and access to a labor force with deep experience in the city's industrial economy, all supported by strong regional economic driver clusters in manufacturing.

4. **…but not necessarily in the all the areas that are currently zoned for industrial use.** Key challenges to providing appropriate space for industrial redevelopment in the Harbor District center around trucking access. Much of the historically industrial land in the District is well served by rail and waterfront. However, typical of modern industry, the sectors with potential for success in Milwaukee tend to ship products by truck. Waterfront areas on the west side of the Inner Harbor experience significant constraints in truck access due the low clearances at the streets underpassing the railroad viaduct. It may be unreasonably costly to enhance access to the degree necessary to create modern industrial space. When determining the highest and best uses of these subareas, it may be reasonable to consider redevelopment that allows, but does not mandate, manufacturing.
5. **…and not only for industries that benefit from water access.** The Port of Milwaukee continues to provide a valuable service, allowing some economic activities that could not reasonably be undertaken anywhere else in the region. Of the key emerging sectors of the future, only one – renewable energy with its need to transport large wind generation equipment – can be said to directly benefit from the presence of the Port. Similarly, although some of the emerging sectors are dependent on access to high volumes of fresh water – a key competitive advantage for Milwaukee – none of them benefits from being located on the waterfront itself. It should be noted that a non-growth sector – marine services – does have to be located on the waterfront, and the Harbor District provides the only location in the City where these activities can reasonably take place.

   Finally, a set of industry sectors for which access to water may be an asset were identified – these sectors are aligned with Milwaukee's driver clusters, indicating that a reasonable economic environment exists in the city for them to thrive. If these industries can be attracted to the region, the Harbor District could provide a home for them. It may be easier to attract them to the District than elsewhere in the city precisely because they choose to be associated with waterfronts or proximity to waterfronts, even though their industrial process and shipping needs don't require them to be there.

   Milwaukee bases its industrial economic development activities around growing and supporting existing manufacturing clusters. This evaluation has identified additional end market opportunities that may be a focus for growth over the coming decades, aligning the region's economic strengths and emerging productivity advances. It is noteworthy that the Harbor District does not appear to offer distinct locational advantages to any of these sectors *from a strictly manufacturing point of view* – with the exceptions noted above – in comparison to the city's other manufacturing districts. In fact, for the area along the water's edge in the Gateway, Harbor View, Freshwater Point and Solvay precincts, the land value premium expected for a waterfront location may create a barrier to modern industrial redevelopment. There are areas in the Harbor District that are more likely to be well suited to focused industrial redevelopment, particularly in the Grand Trunk, Transfer and Lower Kinnickinnic precincts, which offer significantly better truck access – along with access to rail and the potential for waterfront access as well.

   Finally, given the larger economic conditions affecting activity at the Port of Milwaukee, and given the proportion of land on Jones Island that is still able to be developed, it is unlikely that the large parcels off the Island that are currently under the Port's control will be in demand for port related

uses in the near term. The Port's current lease structure favors stability rather than growth, and other changes in the port's business model could provide opportunities to free up even more land area on Jones Island to enable the port to respond to future market opportunities. Waterfrontage along the Kinnickinnic River near the Grand Trunk parcel could be reserved for future industrial uses, allowing expansion of loading and transfer activities if needed in the future.

6. **The Port of Milwaukee can become more flexible to respond to future markets.** It should be stressed that potential changes in the Port's business model or land management are not necessarily driven by failures to respond to its markets and tenants. On the contrary, the Port of Milwaukee is praised for its collaboration with tenants, industry and shippers and the Port operates in the black.

   While difficult to predict, trends in Great Lakes shipping do not seem to hint at the emergence of markets that will require significant new infrastructure if the Port is capitalize on them. Instead, the Port of Milwaukee could focus capital and operating resources on creating flexibility to respond to market challenges on its core footprint on Jones Island by improving conveyance systems to allow products to move through the Port more quickly. There are regional examples of ports that have reinvented and streamlined their operating models. The Port of Milwaukee is not limited by docking space, and focusing on product velocity could ultimately be more cost effective than adding land to the Port in the Outer Harbor or reserving land on the west side of the Inner Harbor for port use. Moving bulk materials such as road salt elsewhere in the region for distribution would make that distribution more efficient by originating in a central location, provide more short term lay down space and finally encourage port leaseholders to think creatively about property under their control. The Port already treats some commodities this way, such as steel.

   Rethinking lease terms – most ports no longer grant century-long leases – would incentivize creative thinking to allow the Port and its tenants to respond more quickly to emerging market conditions. Finally, centering operations on Jones Island is reasonable given the restrictions of the Public Trust doctrine, the excellent truck and rail facilities on the Island (much of which is under the city's control), and the clear separation of uses between Jones Island and adjacent areas. Any changes to the Port of Milwaukee's business model would require consensus and cooperation from numerous stakeholders along with comprehensive benefit-cost analyses. Finally, as in Cleveland and St. Louis, the Port of Milwaukee could expand its mission to better align and manage freight movement across all modes, to the benefit of industrial development throughout the City.

7. **There is a future for service and office uses too.** More than half of the sectors of the future on which Milwaukee may be able to capitalize are centered on office and service work. That said, demand for new office space in Milwaukee has been very weak for more than a decade, and much lower grade office space downtown is being converted to residential uses. Due to this history of weak demand, providing large scale opportunities in the Harbor District for office development may come at the expense of redevelopment in other areas, particularly in the Park East corridor and the eastern end of the Menomonee Valley. Over the longer term, however, the waterfront locations in the District may offer distinct competitive advantages for office and commercial redevelopment, as waterfront amenities could prove to be decisive differentiator. However, the any redevelopment of

industrial land in the District will require incentivizing to create "shovel-ready" sites. The analysis shows a demand for only 7-10 acres of land for office use over the next ten years, assuming the Harbor District were able to capture all of the City's share of regional new office development.

8. **Allowing some underutilized industrial land to convert to commercial and residential uses has the potential to create considerable value.** With a focused effort, some portion of city-wide office or mixed use redevelopment could be attracted to the Harbor District, bringing with it a growth in taxable land value. While privately owned land in the Harbor District produces taxable value at a rate higher than that of the city as a whole, values in adjacent neighborhoods demonstrate that there is potential for major growth by this measure. Mixed use development brings with it high land values, especially in areas near the central business district. Such development has a differing distribution of employment than does industrial redevelopment, however, creating stratified employment opportunities in service industries, along with more highly remunerative professional employment open to workers with high levels of education. This type of development is unlikely to serve the working population in Walker's Point – which has experienced an erosion of earnings – as well as manufacturing development would.
9. **An equitable distribution of potential new employment will require intentionality.** Supporting growth of the District's base of manufacturing activities provides the best opportunity to foster improved employment prospects for workers in adjacent neighborhoods and throughout the city. The jobs created in the manufacturing sector provide better wages to people across a variety of education levels than does employment in the service sectors. Furthermore, industrial employment creates opportunities for advancement in ways that service sector jobs cannot. Mixed use development in the District will create jobs, but they will be stratified with little ability to advance. Preserving land in the District for future manufacturing may mean both deferring growth in tax based and accepting lower level of property value growth than would be the case with commercial and mixed use redevelopment, but the payoff for workers could be substantial.
10. **The same is true for an equitable distribution of new housing opportunities.** The Milwaukee housing market has not completely recovered to its prerecession levels. This indicates that there is space in the region for additional housing construction. It should be noted of housing construction that – although it has little export potential – it does create large numbers of well-paying jobs for workers across a range of education and experience levels. The redevelopment market is currently providing or planning to provide new housing at a range of price points (higher end in the northern precincts, more moderate or subsidized moving southward along S. 1st Street). The most desirable areas for new housing are most likely located on the waterfront, and development patterns in Milwaukee reveal that waterfront housing tends to gravitate toward higher end market rate units. Prodding the provision of new housing at less than market rates – a key desire of stakeholders –will likely require intervention in the market through tax credits, tax incremental financing or other means.
11. **Investments in the public realm pay off if they demonstrate equity and quality.** Case study communities led off redevelopment efforts by enhancing public access and parkland in their waterfront districts. This demonstrated that the waterfront was intended to be enjoyed by all

citizens and visitors. Similarly, they set high standards for urban design of these public amenities to indicate to the private market the level of quality expected in redevelopment efforts.

12. **Separate port and industrial activities from commercial, housing and recreational uses to enable all of them to thrive.** Case study waterfronts converted industrial land to other uses, and drew a clear line between these activities. This both signaled to the market that the waterfront had a future for non-industrial uses and made clear the areas where manufacturing would be supported in the future. Past planning efforts in Milwaukee have shown that industrial business owners prefer generally to operate in areas exclusive to manufacturers in order to reduce conflicts with other uses (particularly housing and institutional uses; there is some flexibility to coexist with entertainment uses) and to reduce the likelihood of growing land values creating economic pressure to change uses. If the Harbor District is to reserve areas for manufacturing, these should be clearly delineated in the plan and should be located to take advantage of natural and built boundaries between adjacent uses. The hard line between uses in the case study redevelopment areas extends to port activities as well.

Notice of Limitations

This report documents findings of an economic analysis. It is based in part on data provided by others and is not intended to be comprehensive in nature. Major policy, planning, infrastructure and investment decisions should not be made based solely on the analysis documented in this market study. It is intended to contribute to future decision making as part of a thorough land use and economic development planning process.